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LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

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Editorial Notes.

Proposed Petition for a Royal Charter for the Institution.

THE whole of the British gas profession will receive with the liveliest satisfaction the news that the Council of the Institution of Gas Engineers have under consideration a petition to His Majesty the King for a Royal Charter. The Institution has a record which justifies its incorporation by Royal Charter, which recognition would enhance its status as a body representative of the profession of gas engineering. It would also be the means of enabling it more fully than hitherto to achieve the objects it has in view, and would tend to the greater development of gas science. In all these ways, the best interests of the community would be served. The scheme, we are confident, will be heartily welcomed by the members, who are anxious for everything to be done which will raise the status and advance the objects of their central body, of which they are rightly proud. The Institution of Electrical Engineers were granted a Royal Charter some time ago; and the older professional organization not only aspires to, but deserves, similar honour.

The Institution has a splendid record, which, we believe, the petition to His Majesty will set forth with brevity, and yet appealing conclusiveness. The corporate history of the British gas profession dates from 1863, when the British Association of Gas Managers was founded. From then, under the original designation, and those since in use, the objects of the organization have been to promote the general advancement of the gas industry in all its branches, including the special training of the men who are destined to take their place in the ranks of the profession; and the objects are carried out without the members deriving any remuneration or other professional financial advantage from their membership. The members of the Institution, too, can claim a large and patriotic part in service during the Great War; and their work was, in fitting terms, acknowledged by the late Lord Moulton, Director-General of Explosive Supplies, when he was President of the Institution in 1916. What gas has done to public and industrial advantage, and in creating healthier conditions for the community, stand to its credit; and the Institution itself has taken a leading part in originating, or being intimately concerned in, the development of gas science in the world which has issued in such material public benefit. It has the proud distinction of having as an Honorary Life Member, H.R.H. the Prince of Wales, K.G.; and its records include the names of men who have been conspicuous in the world of science and in contributing to the common weal.

Beyond this brief intimation regarding the proposed petition for a Royal Charter, we cannot go until there is development, which will not be long. The Council, as will be seen from the minutes published in a later column, had the matter before them at their meeting on Monday, when it was decided that they should hold a special meeting on March 12 to consider the petition. Before it is presented, however, a special meeting of the Institution will be convened for April 2, for the purpose of submitting, for the approval of the corporate members, the terms of the petition to the Privy Council, the Charter, and Bye-Laws. Notification is also given that further interest will be provided for the members who are in town that day, as arrangements are being made for a visit of inspection to the new waterless gasholder at the Staines Works of the Gas Light and Coke Company, and, if practicable, to the new installation of low-temperature carbonization plant at the Richmond works, which is being constructed in accordance with the agreement entered into between the Government and the Company. For the provision of this notable interest for the afternoon, thanks are due to the courtesy of the Governor and Board of the Company.

Development Possibilities.

THE eyes of the gas profession should be directed to the address which Mr. Thomas Hardie, M.Inst.C.E., the Chief Engineer of the Gas Light and Coke Company, lately delivered to the Western Junior Gas Association, as published in the "JOURNAL" last week. The Association are to be congratulated upon being the channel through which such a deliverance reached the gas industry. It examines present more or less experimental developments to ascertain the possibilities for remunerative expansion of the work of the industry; and in it, too, we see the critical and analytical mind brought to bear upon certain current conditions. All the matters subject to review are of vital importance. Nothing must be left undone which can be done to realize profit from present waste. Even the plant that is idle in the summer time through the limitation of the need of it to winter is waste during the period of unproductiveness; and if it can be given profitable employment in summer through new knowledge, so much the better for those undertakings that are in the position to take advantage of it, and for the consumers of the primary product. Mr. Hardie pithily, but deliberately, scatters the jeremiads of those who are too mentally blind to see that the gas industry has made substantial technical progress. Had it not done so, it would have been defunct, or be bordering on that state. The fact is that, through the application of science to plant and methods, we have been able to make conquest over the changes in economic circumstance; and so still hold our own, and expand remarkably our service, to the benefit of those who accept it. We must not, however, rest solely upon that.

Change begets change. We see erosion here and there of parts of our commercial structure, and attacks are being made upon other parts. Electricity has scored some success; but the gas business flourishes, and shows no abate-

ment of increase. Certain of our markets for coke are being attacked by coke-oven produce; tar is for one important use challenged by bitumen; synthetic ammonia has caused a shrinkage in the aid we received from ammonia in reducing the net cost of coal. The address bids us look round and consider what possibilities exist for the industry by departures from accepted practice. We have time and again urged such examination. The address directs to fresh avenues, and new light is thrown upon things which research is drawing from the latent. Nothing can be more attractive and stimulating to the progressive engineer than to see opening up the prospect of increasing the income from his plant by additional utilization, which would supply him with the means of occupying new fields of profitable application for his staple product. Mr. Hardie appeals to our imagination, and incites concentration upon new considerations. For example, gas manufacturers are the largest producers of hydrogen and carbon monoxide in the country; and if they could, during the summer months, economically operate idle plant for the production of those gases—not for sale as gases, but for conversion into other products—then there would be new profit for their undertakings. The gases mentioned, as he tells us, are very important to certain industries which are just emerging from the experimental stage. The production of methanol and synthol, the manufacture of synthetic ammonia, and the hydrogenation of coal could possibly be accomplished very economically at many large gas-works. Remembering the speed at which successful research and experimental work may be translated into commercial operation, it behoves all interested in gas manufacture to keep in the closest touch with these developments. That is sound advice. The gas industry has missed opportunities for expansion in the past. It must see to it that it does not do so in the future, where it holds the superior position in commercially promoting utility which has been revealed by the explorations of science.

There must not be too much modesty on the part of the industry in showing what it can do; and the application of new trading methods which will assist our development must not be the subject of mere passing interest and talk, but must be actively investigated and, if feasible, adopted. We are out for business by every legitimate and rational means. Not all among us keep in view the fact that the gas industry has successfully changed from a 100 p.ct. lighting load to a 90 p.ct. heating load. When that is well established in mind, a broader view will be taken of our extraordinary opportunities. Mr. Hardie points out how in other industries reorganization is proceeding, with standardization and mass production. That is an example of opportunity. Such developments require a fuel which occupies the minimum space, is clean, and under simple and perfect control—in short, a standardized fuel which can be definitely managed. A standardized fuel is the natural concomitant of, or component in, standardization of productive means; and it displaces inconstancy by constancy, and gives freedom in regulation to temperature need. Again, as new industries come into being, the most reliable fuel is required; and gas should in them at once leap into preferential demand. In America gas has quantitatively beaten this country in its application, particularly in industry. The figures which are given in the address show a *per capita* superiority over this country, ranging from 2700 c.ft. to about 5000 c.ft. Omitting Birmingham, with its great industrial load, the best *per capita* consumption for this country is London, with 10,100 c.ft., compared with 12,837 c.ft. in Washington; while of the five centres quoted for this country, Manchester is lowest with 7690 c.ft., as against 12,325 c.ft. for New York. There we have a challenge to our gas salesmen to do more to boost-up demand. In domestic heating, the number of houses in this country in which central heating is used is increasing; and Mr. Hardie sees that the line of future domestic heating development will be by the use of coke-heated boilers for central heating, and gas fires for "topping" the temperature, and giving a "live" heater in the rooms—the combination being low in cost and admirable in results. Methods of charging for gas form a highly important factor in the current and prospective situation of the industry. There is in the address distinct favour for the two-part tariff, on the ground that it is becoming more and more apparent that we must adopt a method of charging which will meet electrical competition. We would go farther and say that we must adopt a two-part tariff, with the secondary charge as low as possible, in order to encourage the more general utilization of gas for all heating purposes.

This brings Mr. Hardie to discuss the question of the competition that the industry has to face; and in what he says there is wisdom. He strongly advises the smaller undertakings to consider at once the question of linking-up their fortunes with neighbouring larger concerns. An intelligent appreciation of the possibilities of the future seems to be sadly lacking among the administrators of some of the smaller concerns; and their attention may be particularly directed to these words: "While it may always be well to look on the best side of things, it is also best to be prepared for the worst." There is a tendency, we fear, to procrastination. The generation and transmission plans of the electricity industry under the 1926 Act are in process of development, and, in fact, their materialization in Scotland is already well in hand. Presently there will be rapid progress with the work in the South-East of England, then in the Midlands, and other quarters of the country will follow. It is no good waiting until the eve of the opening of new or more intensive competition before beginning to consider the question of amalgamation. Time is required to bring it to pass. We hope Mr. Hardie's advice regarding this matter will have good effect. The address also refers to the spreading competition with our secondary products. It is gratifying to find that, in Mr. Hardie's large experience, the years of effort in developing the markets for coke are now bearing fruit; and he deliberately says that they can be brought to a state of full absorption of the output, if gas undertakings will only take the trouble to produce the coke suitable for application to any purpose. The days of neglect of quality and grading must be left behind. There need be no difficulty in this if there is prudent choice of coal and plant, blending, &c., so that ash, moisture, reactivity, and clinkering characteristics are regular. However, having done so much to develop the markets, it is found that our friends, the bye-product coke manufacturers, are entering into the enjoyment of the results of our labour, and have commenced an active invasion. On the Continent, and in America, there is a considerable demand for hard coke of the oven type for use in furnaces and large central heating installations, and many gas undertakings there have installed coke-ovens for gas manufacture and the production of the qualities of coke necessary for this particular application. If similar conditions are cultivated here, there is no reason why the gas industry should not more widely adopt coke-oven equipment. Reference is also made to competition with gas-works tar and sulphate of ammonia. But in all these directions, it is obvious that Mr. Hardie takes the optimistic view that the gas industry has an innate capacity for defending itself. If new processes successfully assail any of our secondary products, our scope, research, and new opportunities will enable us to adjust our operations accordingly. It is a highly satisfactory condition; and a robust belief in ability is not a bad thing in these times of mutation in trading circumstances.

The Finance of Coke-Oven Gas.

FOR the managers of gas undertakings who are doing, or are contemplating, business with coke-oven plant owners for a bulk supply of gas, there are considerations in Mr. Hardie's address which will cause some meditation and computation to see how the finance of the matter actually stands. From the fuel conservation point of view, there is no question that, if coke-oven gas can be supplied to gas undertakings at a price that will pay them to receive it, and their obligations as suppliers are fully protected, then there should be business relations. But the question arises whether in the contracts that have been entered into, all the factors involved in a correct price for the gas undertaking have been taken into account. Furthermore, it must not be overlooked, in making long forward contracts, that what may be a favourable price for coke-oven gas at one time may not be so at another. At

the moment, conditions are favourable, as the cost of home-produced gas into the holders is on the high side, because of the relative values of coal and secondary products. Should net coal figures as low as those obtaining before 1914 be reached, Mr. Hardie is of opinion that some of the prices now being paid for coke-oven gas supplies in bulk will prove a drawback to giving consumers gas at a low figure. Manifestly he does not fear the challenging of his figures and submissions; for he offers the data freely for examination. The first estimates presented show that the cost of transmission of gas in quantities equal to the requirements of the Gas Light and Coke Company would be 5d. per 1000 c.ft. for distances of 100 miles, and 7¼d. for 200 miles. These costs exceed those which have been presented by others who have dived into the question of gas transmission; and so there may be some attempt to disprove the new computations.

Still more important is the discussion of the items that should have careful examination and estimation before terms for a bulk supply are settled. We are afraid coke-oven owners and managers will not regard this critical examination with any marked approval. The lines of consideration are set-out in detail in the address. They refer to the costs associated with mains and pumping plant, stand-by plant, and the augmented cost of gas production at the gas-works through the average increase of standing charges per 1000 c.ft. Mr. Hardie is richly suggestive in this connection; but all we can refer to here is his ultimate cost deductions, which, of course, must be taken as having only approximate value, and must therefore be recalculated for individual schemes. The items under the three headings are: Mains, &c., 2·5d. per 1000 c.ft.; stand-by costs, 3·5d.; increase in production cost, 1d. The greatest item—and it is an essential one—is that of stand-by costs; and, therefore, it is on this that the coke-oven owners have to concentrate with the view of realizing the desideratum of absolute permanence in supply. Even a guarantee would not, we are afraid, after the bitter experiences of the past, completely satisfy the responsible managers of gas undertakings, who would have to place it in the balance against their obligations. However, the items named amount to 7d. To this there falls to be added another figure. Mr. Hardie rightly presumes that a gas undertaking would not take a bulk supply unless there is something to be gained; and he suggests as a reasonable allowance 1·5d. per 1000 c.ft., which would be some safeguard against the risk of the cost of the oven gas being against the gas undertaking's interest in future. The items make 8·5d. as the charge additional to a gas-works' ordinary cost into the holder. Deducting this from the net cost of home-produced gas in the holder, and assuming it is 1s. per 1000 c.ft., we have a net price of 3·5d. for the coke-oven gas. This, as is mentioned in the address, is equivalent to 0·7d. per therm—a price less than the therm value of coal at 15s. per ton, and therefore cheaper than coal as a fuel. We undertake to say that before long coke-oven gas producers will be saying that this very fact proves that Mr. Hardie's figures err on the high side. But to substantiate error in the result, the premises upon which he founds his claim must be proved fallacious. While there is admission that there will be instances in which contracts can be made for the purchase of oven gas by gas undertakings which will be advantageous to both parties, it is the view of this competent observer and critic that it seems unlikely that the hopes of coke-oven managers of selling large quantities of gas to local undertakings will be realized, beyond what can be done in exceptional circumstances. Hence the suggestion that colliery owners, who are considering the question of extending coke-oven plant, may conclude that the certain and more easily ascertained profit they can obtain by the sale of coal to gas undertakings is to be preferred to the more speculative business of building bye-product coke-ovens, until the time comes when the price of coke is so much more favourable as to make the sale of their gas at comparatively high rates less essential.

We regard this as a highly important contribution to the problem of a correct price to pay for coke-oven gas in bulk. There may be loopholes for argument in the case presented in the address; if there are, we have no doubt Mr. Hardie would welcome any submissions for consideration, and, if convincing, would be the first to acknowledge their soundness.

A Healthy Position.

An examination of the accounts of the South Metropolitan Gas Company for 1927 shows a strong and healthy position. This is found not only in the more favourable markets for buying and selling materials, in the restoration of the price of the therm to the pre-stoppage figure, and the continued expansion of the primary business, but in expenditure which is evidence that, in the forefront of policy to-day, the Board are pursuing closely and steadfastly that imperative work of bringing and keeping consumers' appliances up to a proper standard of efficiency to produce and maintain satisfaction. The report itself dismisses this important subject with the remark that "the increase in the outlay upon gas-using apparatus has arisen largely from the heavy cost of replacing obsolete stoves." The sentence is sufficient; and it is good reading for those proprietors who appreciate the needs of the times and the best lines of protection for the future. The same policy is seen in relation to the manufacturing plant. Referring to the expenditure thereon, the report mentions that much of it is being incurred in connection with the endeavours to meet the exigent requirements of coke consumers. We know what the "exigent requirements" of coke consumers are; but there would be interest for gas engineers and managers to know more of the details of the work which the Company have been carrying out to meet them. However, a progressive and developing undertaking such as this cannot go on without new capital expenditure. During last year the mutual working arrangement with the South Suburban Company was consummated; and £500,000 now stands in the capital account as representing investment in that undertaking, in accordance with the powers of the 1925 Act. It is clear from the capital account that, in order to make provision for the development of the business, it will be necessary to raise additional capital, which will considerably reduce the balance of the statutory authorization. Hence the need for incorporating in the Bill which is now being promoted in Parliament proposals for enlarging the capital powers.

The accounts are interesting when compared with the operations of the coal-stoppage year. Coal has been purchased at more reasonable prices, the returns from coke and tar have been good; sulphate of ammonia is the black spot. In spending £1,715,050 on coal into store, there was a reduction, compared with 1926, of £293,849, though the quantity carbonized was 1,264,341 tons, or 9830 tons more. Although the contribution to revenue of secondary products was £64,269 less—£1,045,337, as compared with £1,109,606—the net cost of coal last year was £669,713, as against £899,293, or a reduction of £229,580, despite the greater quantity carbonized. This gives another insight into the burden of the coal stoppage, though coke was then fetching a higher price, and more was sold. The exact difference was that in 1927, the income from coke was £684,122, compared with £785,159 in 1926, or a reduction of £101,037, with 9597 tons less sold. Breeze produced £1016, as against £10,304 in 1926. But tar was the bright feature in this section, yielding £297,024, as compared with £244,263 in the previous year, or an increase of £52,761. On the other hand, ammonia, &c., has again receded; having contributed to income only £63,174, against £69,878 in 1926—a falling-off of £6704. However, the total make of gas from the coal carbonized was 92,923,221 therms; and 314,032 therms were purchased from the Fuel Research Station. The working was good; the production being 73·5 therms per ton, as compared with 73·38 therms in 1926. Including the gas purchased from the Fuel Research Station, the quantity of gas put into the holders increased during the year by 1,029,289 therms; excluding it, by 861,448 therms.

The increase in the sales of gas amounted to 538,626 therms—89,927,520, compared with 89,388,894. Private consumers purchased 87,925,323 therms—an increase of 313,262 therms; and public lamps took 2,002,197 therms, which was more by 225,364 therms than in 1926. As the number of public lamps was 25,930 (only three more than in 1926), the increase in public lighting is probably in large measure due to the fact that there was a curtailment in the street lighting during the coal stoppage. Regarding the

receipts for gas, in 1926 the price of gas varied from 8¾d. per therm to 9½d., and then went to 10¼d.; while last year the price was 10d. and 9¼d., and a reduction has been announced to 8¾d. The total income from gas last year was £3,412,201, against £3,307,135—an increase of £105,066, to which private consumers contributed £96,664, and public lamps £8401. The stability and expansion of the business are assured in several ways. One is found in the statement in the report that during the year the number of consumers has increased by 4405. It is seen, too, that the new capital outlay on stoves and fires was £23,252; and there is the liberal expenditure on the repair and renewal of stoves and fires. It is also noted that there has been an increase from £124,364 to £129,551 in the meter rental (or £5187), while the rental for stoves and fires has been enlarged from £142,375 to £151,063—an advance of £8688. All these are grounds for good confidence in respect of the future.

On the expenditure side of the revenue account, there is the exceptional item of £22,647 in connection with the South Suburban agreement. The co-partnership insurance fund represents a charge of £74,822, but other items affecting benefits have been substantially reduced. In the result we have a total income of £4,887,976, and an expenditure of £4,326,007, which gives a balance of £561,969 to be carried forward to the net revenue account. The Directors recommend the payment of a dividend at the rate of 6¼ p.ct. per annum, less the interim dividend of 2½ p.ct., which will permit of the allocation of £82,623 to the employees' co-partnership fund. In the previous year, the dividend was 6 p.ct.

When the President (Dr. Charles Carpenter) submits these accounts to the proprietors next Wednesday, we are sure the verdict will be that the state of affairs they reveal, after the destructive events of 1926, is healthy, highly satisfactory, and protective of the future interests of the proprietors.

"B.C.G.A." District Conferences.

THE British Commercial Gas Association District Conferences have made a good start this year with the one held in Edinburgh towards the end of January, as reported in the last two issues of the "JOURNAL." Simultaneously, the Edinburgh Corporation were running a fine Health and Hygiene Exhibition, in which gas had a remarkably attractive display owing to energetic planning and execution by the Corporation Gas Department. It was not only a display of goods, but a demonstration of application and efficiency at the modern high standards. Other conferences have been arranged for the south-west district in Ilfracombe on April 13; for the Midlands, at Redditch on May 9; and Cornwall will have its turn at Truro on May 24. These district conferences are profitable events, as they afford opportunities for neighbouring gas suppliers to have informal discussions on gas-trading enterprise and its objectives, which is excellent from the administrative aspect. At the same time, they supply a channel for communicating to the public the capabilities of the industry in their service.

Reading the reports of the Edinburgh Conference, there is one thing that particularly strikes us, and that is the great importance of thoroughness in method in the development of the primary business of the industry. For example, it is wiser to start well fundamentally than to proceed with the exploitation of business in a haphazard, though it may be energetic, manner. We find strong advocacy of system in the paper which Mr. F. W. Goodenough submitted. He remarked that "no good or effective service can be rendered nor the maximum amount of gas or of gas apparatus sold in any other or less painstaking way until, in fact, all the avenues of profitable business have been explored." Surveys of districts for this purpose have been urged time and again; and experience proves the extraordinary value, in promoting additional consumption on the most economical terms, of a register of fixed apparatus, whether privately owned or hired, and of opportunities for new business. Without such a record, it is impossible to take in hand the development of the gas business along the most systematic lines. Another point which impresses one in reading the discussions, and the paper by Dr. William Robertson on "Atmospheric Pollution," is that it is important in the development of the gas business to explore thoroughly the reasons why people do not for heating adopt gas or smokeless coke in preference to crude coal. We should have full knowledge of the reasons which impede the progress of gas and coke as fuels just as much as a knowledge of the virtues which promote it. Successful as the industry has been, it has to be confessed that a large amount of misconception and misinformation still exists, and has to be cleared away. Not until we have the acceptance by a person of the use of gas or coke for heating purposes, can we say that the deterring cause has been passed; and the more we can bring householders over that line, the better and the faster will be our progress. Another point emphasized at the conference is that it is absolutely necessary to get rid of apparatus of obsolete design and construction. Many gas undertakings are spending a large amount of money in this direction; and it is money well spent. In many ways our defences against competition can be strengthened, if only gas administrators will authorize the work.

We look forward to the other "B.C.G.A." district conferences which have been arranged for the immediate future being of the same high standard and as effective as the one held in Edinburgh.

The Rates and Industry.

INDUSTRY through its organizations has for several years been making appeal to the Government to retrench in the matter of national expenditure so that taxation may be reduced, and to impress upon local authorities the need for curtailing their expenditure in order to diminish the rates. In both directions, there is room for much to be done to help industries and commerce to a state of greater prosperity. The Government say they are applying the axe as far as possible; the trouble is that this professed energy is not being translated into reduced taxation. Indeed, the Chancellor of the Exchequer has lately shattered any hope of a recommendation in his Budget of a reduction of the standard rate of income-tax, which industries and individuals would welcome whole-heartedly. But from taxation to local rates. In the Speech from the Throne at the opening of Parliament are these words: "The burden "imposed upon industry and agriculture by the present in- "cidence of local rates has attracted the anxious attention "of my Ministers." The whole country wish His Majesty's Ministers would give more effective "anxious attention" to the lessening of national expenditure. It must be remembered, however, that the legislation of the Government has helped to the inflation of local rates, and probably will not tend to the easing of the way to their reduction in many industrial areas. However, we hope the Government will be successful in the inquiries upon which they are engaged into the possibility of affording some relief from the burden of rates to the producing community, and into the changes in local Government which would thereby be involved. But there are some people who unkindly think (badly as lower rates are required) that this move has been made partly to divert attention from the heavily depressing condition of affairs in respect of national expenditure and taxation.

Coal Carbonization Conference.

Before the next issue of the "JOURNAL" is published, the Coal Carbonization Conference and the British Industries Fair (Birmingham), with its fine Gas Section, will be in full swing. In anticipation of the Conference, the whole of the original papers, and abstracts of those already published but which will come under consideration, have been assembled and issued in a Special Number of the "JOURNAL." Every subscriber on our books should have received a copy; and others who may be interested can secure one for 2s. 6d. It is proposed to publish the "JOURNAL" report of the discussions in a form which will enable it to be appended to the already issued Special Number. A limited number of copies of the papers and discussions combined in a paper cover will be available at 5s. each. Those who desire to book one of these should make early application.

Institution Examinations.

Students who wish to sit for this year's Institution examination, as well as candidates for the Diploma, should take note of Mr. Walter Hole's letter in our "Correspondence" columns to-day.

Coal-Selling Organizations.

Coal-selling organizations appear to be becoming very popular. We learn that, after a protracted conference in Manchester on Tuesday, the Lancashire and Cheshire coalowners decided to throw in their lot with the Three Counties Scheme as originated by Yorkshire, Derbyshire, and Nottinghamshire. The decision is subject to confirmation by the companies who are members of the Lancashire and Cheshire Association. With the incoming of more counties, the title of the Three Counties Scheme will have to be dropped. It is interesting to observe that the coal exporters on the North-East Coast are somewhat perturbed at the Italian Government having set up a coal-selling agency in Italy for disposing of German reparation coal.

Low-Temperature Propaganda.

We see that Low-Temperature Carbonisation, Ltd., have commenced propaganda in an approved modern method. They have given a lunch at Sheffield to mark the commercial development of low-temperature carbonization of coal in Yorkshire. The Chairman of the Company, Sir Arthur Wheeler, Bart., presided; and among the guests were the Lord Mayor of Sheffield, the Deputy Lord Mayor, and medical officers and public health officials of various cities and towns in Yorkshire and Lancashire. The function was associated very much with smoke abatement; and naturally the part that low-temperature coke is going to take in the great atmospheric reform was duly noted and applauded. It fell to Col. W. A. Bristow to respond for the Company. In the course of his remarks, he stated that they are at present carbonizing at their works 1400 tons of coal per week. He claimed that the product is cheaper than electricity or gas, and 25 p.ct. cheaper than coal. A ton of coalite, he declared, will go as far as 1¾ tons of coal. No fundamental data—such as relative calorific values—were given regarding these claims; so there we will leave them.

A Cloud in the Ruhr.

Those gas undertakings in Germany who are already dependent on the Rühr coalfields for supplies of coke-oven gas will be looking somewhat dolefully upon the disturbance of relations between the miners and the coalowners. It appears that the present wages agreement will terminate in April, and the workers have made demands for substantial increases, together with a reduction of working hours. In some quarters the position is regarded as serious, as in the dispute 350,000 or more miners are affected. The stand that the employers are making is that there is no possibility of their being able to grant even a small increase on the present rate of wages, as so many concerns worked last year actually at a loss. British competition is considered to be in some degree responsible for this. On the other hand, the miners' organizations hold that the men will not, after the end of April, work at the old rates.

Miners' Average Coal Output.

The Miners' Federation have issued a statement showing the average output per man per shift in November last. Scotland took the lead with 23·77 cwt.; Leicestershire came second with 23·35 cwt.; and Northumberland third with 23·16. In the eleven other districts, the average output ranged from 16·51 to 22·96 cwt. The average earnings per person employed was 9s. 3·53d. per day in Scotland, compared with 10s. 4·99d. in Yorkshire; 10s. 4·12d. in Derbyshire; 10s. 5·44d. in South Derbyshire; 10s. in Leicestershire; and 10s. 3d. in Warwick.

River Pollution.

We learn that the Joint Advisory Committee on River Pollution (recently appointed by the Minister of Health and the Minister of Agriculture and Fisheries), meeting under the chairmanship of Sir Horace Monro, have heard evidence on the question of administrative machinery. What the Committee wished to arrive at is an opinion as to whether it is desirable to set up, if necessary by compulsion, special watershed bodies on the lines of existing river boards, to prevent the pollution of rivers and streams. In a statement on the subject, the Committee say it has been suggested in many quarters that the present polluted state of rivers is due, at least in part, to failure to administer the existing law. This is attributed to the bodies entrusted with its administration not having, as a rule, the special knowledge and resources required to deal adequately with the problem, and because their activities are in any event confined to limited and artificial areas, whereas the problem is influenced by conditions extending over the whole watershed. The witnesses heard by the Committee were unanimously of opinion that the proper unit for administration purposes is the watershed. The Committee are now inviting evidence from associations representing local government authorities and fishery interests.

Rise in Employment.

The total number of persons on the registers of the employment exchanges in Great Britain on Jan. 2 was 1,336,303; on Jan. 9, the number was 1,232,100, which was 104,203 less than a week before; on Jan. 16, the registers contained 1,193,800 names, which was 38,269 less than the previous week; on Jan. 23, the number was 1,178,750, which was 15,113 less than the week before; by Jan. 30, the number had receded to 1,168,900, which was a decline of 9850 compared with the preceding week.

Air Pollution by Power Stations.

The objection of certain borough councils to the erection of a super-electricity generating station at Battersea has been mentioned in the House of Commons. As was recently remarked, their view is that a station using approximately 800,000 tons of coal per annum will give off a large amount of smoke and sulphur fumes. Lt.-Col. Ashley, Minister of Transport, however, has given them the assurance that their apprehensions are groundless, in view of the fact that one of the conditions attaching to the erection of the station is that the best-known apparatus for consuming smoke shall be used thereat. The objectors, however, understand that 16 tall chimneys will be erected in conjunction with the station; and, though science has made great progress in ameliorating the smoke production from boiler-houses, they cannot reconcile the existence of those chimneys with practically the non-production of smoke. Among other remarks by Lt.-Col. Ashley was one that undoubtedly a good deal of coal would be burned at the station; but, on the other hand, thousands of chimneys would be put out of action in consequence of the use of electricity. It is much more likely that the chimneys will be rendered inactive by the use of gas, and not electricity.

Electrical Peaks and Valleys.

Our electrical friends are always looking for some means whereby they can raise the valleys in their output curves. At one time they thought it would be possible to do this by increasing the cooker and the heating load; but they see that the intermittent and vagarious use of cookers and heaters tends to the creation of new peaks, or the elevation of the lighting one, when least desired. We rather fancy that they would not like the peak which is found from (say) 11 o'clock to 1.30 on Sundays through almost universal cooking by gas; and they would not welcome, given a big cooker connection, the preparations for evening meals, which come simultaneously with the lighting load. Again with room heating. The bulk of the demand for this only comes during the dark days of winter and in severe weather, when people are glad to have any contribution to the heating of their houses. Then the load falls heavily upon the lighting demand. In these ways, instead of valleys being filled by cooking and heating, fresh peaks are often formed. The only solution of the problem is some method of thermal storage; but the drawback to this is that all such systems entail additional cost for installation and maintenance, and inconvenience for the users. The electricity suppliers find it a hard task to justify the utilization of electricity for any heating purpose, in view of the want of adequate storage at the source of production, and the fact that as many as 29 KW.-H. of electricity are required to supply one therm.

PERSONAL.

Mr. C. C. WALMSLEY, a member of the clerical staff of the Accrington District Gas Board, has passed the final examination of the Chartered Institute of Secretaries.

Alderman J. H. WADDINGTON, Chairman of the Halifax Corporation Gas Committee, ex-Mayor of the town, a leading figure in many public services locally, and well-known to members of the gas industry by reason of his enthusiastic interest in the work of the "B.C.G.A.," has been added to the permanent list of Justices of the Peace for Halifax.

OBITUARY.

It is with profound sorrow that we learn of the death, on Sunday last, of Mrs. ARTHUR VALON. In this sorrow a large circle of friends in the gas industry will unite; for Mrs. Valon, who was constant in her attendance at the Institution receptions, and at other functions of the gas profession, was beloved by all who came in contact with her. The deepest sympathy is with our friend and the family in these days of sadness.

We regret to announce the death of Mrs. Ewing, widow of Mr. William Ewing, formerly Engineer and Manager of the Greenock Corporation Gas-Works, which took place at Lenzie on Friday, Feb. 3. She was the mother of Mr. William Ewing, Chief Assistant Engineer and Manager at the Falkirk Corporation Gas-Works.

The "Co-Partnership Journal" of the South Metropolitan Gas Company contains a record of the services of Mr. JOHN MURRAY SOMERVILLE, who died on Dec. 13 last. By his death, the Company have lost a loyal and faithful officer. "Mr. Somerville," it is stated, "was a patient and accurate observer who played an important part in connection with the maintenance of the purity and illuminating-power standards of the gas supplied by the Company. For many years he carried out the experimental work involved in the investigations made by Dr. Carpenter into many problems connected with the production and utilization of town gas. His main interest in life was concentrated in his work, and he was ever ready to apply his valuable knowledge and long experience to the solution of difficult and unexpected problems. His skill as a photometrician was invaluable in everything pertaining to incandescent gas lighting and the manufacture of suitable mantles and fittings of lamps of various types. There is not one among us who has not admired and respected him, and who does not to-day deeply grieve the loss of a much-cherished colleague."

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Feb. 20-March 2.—BRITISH INDUSTRIES FAIR.—Birmingham and London.

Feb. 21-24.—CARBONIZATION CONFERENCE.—Midland Institute, Birmingham.

Feb. 22.—MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.—Joint meeting with YORKSHIRE JUNIOR GAS ASSOCIATION. Visit to the works of the National Gas Engine Company, Ltd., Ashton-under-Lyne. Paper by Mr. W. P. Smith, B.Sc., of Bolton, on "Gas-Works Effluent."

Feb. 22.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of the General Committee in Birmingham.

Feb. 24.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute, 7.30. Paper by Mr. H. J. Escreet, B.Sc., of the Gas Light and Coke Company: "Notes on the Laying of Gas Mains of Large Diameter."

Feb. 25.—SCOTTISH JUNIOR GAS ASSOCIATION (WESTERN DISTRICT).—Visit to the works of Messrs. Walter McGee & Sons, Ltd., Paisley.

March 2.—"B.C.G.A." INDUSTRIAL SALESMEN'S CIRCLE.—Meeting in Birmingham. Address by Dr. C. M. Walter, and visits to the Heat-Treatment Shops at the Windsor Street Gas-Works, and to the British Industries Fair.

March 13.—NATIONAL GAS COUNCIL.—Meeting of the Central Executive Committee.

March 13.—FEDERATION OF GAS EMPLOYERS.—Meeting of the Central Committee.

March 28.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Annual general meeting at the Hotel Cecil, Strand, W.C. 2, at 2.15.

April 13.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the South Western District at Ilfracombe.

May 9.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Midlands District at Redditch.

May 17.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting at Hotel Cecil, W.C. 1, under the presidency of His Grace the Duke of Sutherland.

May 18.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS.—Visit to the works of the Rochester, Chatham, and Gillingham Gas Company.

May 24.—BRITISH COMMERCIAL GAS ASSOCIATION.—Conference of the Cornish District at Truro.

INSTITUTION OF GAS ENGINEERS.

June 12-15.—Annual General Meeting at Cardiff.

ELECTRICITY SUPPLY MEMORANDA.

CAN a Corporation spend the funds of its electricity undertaking in making "free" installations in Council houses? This question has been raised in the Gravesend Town Council; and the result will be of interest to other local authorities, and incidentally to those gas suppliers whose commodity is wrongfully prohibited from entry into houses built by councils administering electricity undertakings. The Town Clerk of Gravesend was asked to give an opinion (1) as to whether the action of the Council in deciding to place power points in Corporation houses free of charge, is legal or otherwise; and (2) whether such procedure, if legal, would or would not involve the Corporation in a liability to provide, if required, free power points for all domestic consumers in the area of supply? The Town Clerk discusses Section 23 of the Electricity (Supply) Act, 1919, which enables a local body authorized to supply electricity to provide, let, or hire, and in respect thereof to connect, repair, maintain, and remove, electric lines, &c., for lighting, heating, and motive power, and the section also empowers the making of charges for so doing. The section is generally spoken of as authorizing the hiring-out of fittings; and the usual practice is to make an increased charge to cover the cost of installation—the transaction being popularly, but somewhat erroneously, referred to as "free wiring." In the opinion of the Town Clerk, the section does not appear to preclude the provision of wiring and fittings free of charge, inasmuch as the word "provide" would seem to contemplate something other than letting at a charge, and the making of a charge is permissive only. On that point we think there might be, if it were worth while, some little difference of opinion with the Town Clerk as to the breadth of meaning to be attached to the word "provide." However, in his judgment, the provision of power points free of charge is not *per se* illegal; and he is supported in this view by an opinion (given in 1925) of Counsel to the Association of Municipal Corporations. But the second part of the reference to the Town Clerk raises the point of preferential treatment. Sections 19 and 20 of the Electric Lighting Act of 1882 enact in effect that all consumers must be given a supply on equal terms. He is therefore of opinion that, if free points are put in any houses by the Corporation acting as undertakers for the supply of electricity (as is clearly contemplated in the present case) by the use of electricity funds, all other domestic consumers are entitled to the same treatment. This would, of course, involve serious liability, which ought not to be incurred without very grave consideration. If the points were put in as part of the cost of a housing scheme, the case would be different; but the Corporation cannot make use of electricity funds without acting as the undertakers for electricity, and the Electricity Acts must apply. Furthermore, Section 5 of the Electricity (Supply) Act, 1926, which now governs the disposal of surplus funds, entirely precludes the application of net profits to any such purposes as contemplated by the resolution of the Gravesend Council. The Council are not likely to face the liability which would be involved by their utilizing electricity funds in providing something free for the tenants on the housing estate.

"Free" Installations.

Domestic Electrification.

In "The Electrical Times" information is published week by week regarding progress in domestic electrification—each instalment referring to three or four supply areas. The sample before us shows that the method of presenting the information is to give the total connections up to March 31, 1927, and in an adjoining statement the increase during 1926-27. The particulars embrace cookers, water-heaters, wash-boilers, radiators, kettles, &c. In one northern town, we see that the total connection of cookers was 566, of which 159 were installed in the year ended March 31 last. The water-heaters numbered eight, of which six were fitted last year. The wash-boilers totalled 174, of which 82 were fixed in 1926-27. In the same town, the latest records show that over 12,000 gas-cookers are in use, between 5000 and 6000 gas-fires, and upwards of 13,000 water-heaters. Taking another town, the electric cookers amount to 123, of which 45 were fixed last year. Water-heaters numbered 58, of which 29 were

fixed in 1926-27. Radiators totalled 3161, of which 906 were connected last year. In that case, the gas-cookers are in excess of 9000, the gas fires number upwards of 1300, and water-heaters 750. These figures are exclusive of appliances privately owned. We come to a power supply company, whose district embraces 632 square miles. Their cooker connections at March 31 last were 603, of which 163 were added last year. It will be noted that the cooker average is less than 1 per square mile. In that case, wash-boilers account for 8; and radiators number 1408. We cannot give the figures for gas connections, seeing that the area includes a number of gas-supply undertakings whose districts are not co-terminous with the limits of the Power Supply Company. The same applies to a metropolitan borough, in which 251 cookers had been connected up to March 31, 1927, of which 83 were fitted in 1926-27. In that case water-heaters numbered 75, of which 27 were fixed during 1926-27. Radiator connections were 652, of which 229 were made last year. A word of warning should be given to electrical readers of the details given in our contemporary. In each case, the compiler states the cost of gas at per therm, and, taking electricity at the figure charged per unit, he works out the cost per therm ratio, gas/electricity. In one case this is shown to be 1 : 2·8; in another, 1 : 2·6; in the third, 1 : 3·16; in the fourth—comparing the cost of gas per therm, 11·8d., with the average price obtained on the "all-in" system for electricity—the cost per therm ratio, gas/electricity, works out at 1 : 2·9 approximately. What electrical readers must be careful of is not to assume that these ratios apply at the present time. In many cases they do not. For instance, in the last one the charge to ordinary gas consumers to-day is not 11·8d. but 8·6d.

Common Experiences.

Such installation figures as those quoted in the preceding paragraph are not by any means astonishing to gas men, unless it be their smallness in relation to the areas and populations served. It would be a strange thing if, among those who are associated with corporations as members or employees or tenants of municipal houses, or those who are directors, shareholders, or employees of electricity companies, a few hundred electrical appliances could not be placed. Of course there are also people who are always prepared to spend money on novelty, though utility is not necessarily improved. Probably if electricity had been first in the field for general purposes, and gas had come along subsequently, showing its economies and efficiencies as they obtain to-day, it would have done more than electricity is doing in bringing about conversions in use, and those conversions would have become permanently established. In domestic electrification there is much sameness in experiences in different areas. Something of this kind frequently goes on: A gas consumer has an old cooker in use; the gas suppliers advise him to have a more efficient one. The consumer in some cases says: "No, I am going to have an electric cooker." The gas cooker is transferred to the gas suppliers' stores; and an electric cooker is fixed. In a few months, the consumer returns to the gas showrooms, selects a modern gas cooker, and it takes the place of the disappointing electric cooker. That is somewhat common experience; and why is it? The answer is plain. Thus such figures as those quoted above do not represent the total connections of electric cookers that have been made; they are net data, after deducting supersessions of the electrical pretender by the familiar and constant friend the gas cooker. Another experience of gas suppliers is that usually householders who adopt electric lighting maintain a supply of gas in the house; and through new heating connections the consumption is greatly increased over and beyond what it was when the lighting was by gas. And gas consumers, owing to the electrical competition, obtain much greater attention from the gas suppliers than they were accustomed to in pre-competition times.

Fitting an Electric Cooker.

A Special Sub-Committee who have been considering for some six months the affairs of the Glasgow Electricity Department have issued a report reflecting upon the administration and expenditure of the Department in a manner which must afford unpleasant reading for all concerned. In the results we are not immediately interested; but the report has given rise to a large amount of correspondence in the local papers. Among the letters is one which apparently is directed to the question of inefficient management; and it was written by someone signing himself "J. W. M." He says that he arranged at the last Housing Exhibition to instal an electric cooker. As a result, one man was sent to take the measurements for the wiring; an outside contractor came to fix the wiring; four men arrived with the cooker; two men with a new meter; and one man to connect the cooker. The kettle was minus the plug; and three men arrived at intervals to fit one. Later in the day two other men put in apparance to connect the cooker; and, when informed of the number that had been before, they remarked on the good attention the consumer was getting. Then there were three visits from a lady demonstrator before and after the cooker was fixed. All this attention by employees of the Department does not include the motor drivers, of whom there were three. Thus it took seventeen men and one lady demonstrator to attend to the fixing and bringing into operation of this one electric cooker before the job was completed. A "Contractor," thinking the letter by "J. W. M." was not altogether fair, says that it is not the experience of many consumers who have had similar apparatus installed. He states that the number of men normally engaged to complete one electric cooker installation is nine—viz., the inspector who measures up (one man); the contractor who fits the wiring (two men); the meter department, if new installation (one man); if change of meter is involved, two men. The stores department deliver the cooker (four men). He adds the essential services of the lady demonstrator, making a total of ten persons to carry out the work, as against the eighteen mentioned by "J. W. M."

The Week.

We are grieved. The "Electrician" tells us that the first National Electric Week ever organized in this country has now passed, and is forgotten by many members of the electrical community. As the week was in December, of course it has "now passed." But it is marvellous how short must be the memories of many members of the electrical community if they have already forgotten the wonderful (according to some accounts of it) six days' effort. The "Electrician" has circulated a number of questions among those who participated in the endeavour to induce an impetus to electrical buying during that period. Our contemporary cannot state that it is joyful over the results of its inquisitiveness. One question was, "Did the week materially increase your sales of domestic appliances?" And the answers came in the ratio of two affirmatives to five negatives. That is bad. The question, "What effect did the special window display exert on these sales?" showed a proportion of 2 to 1 who were unable to attribute any effect to the display, even when allowance is made for those who "cannot say." To the question, "Were you able to trace any direct results to the National Electric Week newspaper advertising, either national or local?" only 25 p.ct. of the replies were definitely favourable. But a "predominating large proportion of favourable replies" were received to the question whether, "Apart from actual sales, did the week create a favourable impression locally?" "How in your opinion could the 1927 week have been improved?" elicited surprisingly few constructive replies "in view of the critical tone of many of the answers to the earlier questions." The next inquiry was, "Are you in favour of the organization of a similar week next year?" and over 98 p.ct. of the answers were in favour. The value of the 98 p.ct. depends on the number of people to whom the inquiry was addressed, and the number of replies received. However, it is mentioned that an earlier date is favoured for the holding of "the week," and that it is thought the period should be extended to a fortnight.

Mishaps.

Bootle was startled on the morning of Feb. 5 by, so the papers say, a roar which was heard a mile away. It was an explosion which wrecked a dwelling-house in Litherland Road; and four persons had a very narrow escape. Preceding the explosion, flames were seen issuing from the pavement, accompanied by clouds of black smoke. An occupant of the house evidently knew what the mischief was, for he hurried to the power station, some 200 yards away, and gave information. The newspaper report states that burning electric cables are not an unusual experience in this district; and the opinion was expressed at the power station that nothing could be done, and that the cable should be allowed to burn itself out. Probably this statement is not quite what was actually said. Just after the householder reached home, the explosion happened; and the house was destroyed. The following day the electric cable was under repair. Investigation showed that the gas main in the road was not affected in any way. Half of Bermondsey and part of Rotherhithe—an area of some two square miles—was subjected to deprivation of electricity by a failure on Wednesday evening last week. At the same time an electric cable in Jamaica Road, Bermondsey, fused, and two manhole covers were blown violently into the air, injuring a vanman, who was taken to hospital unconscious with wounds on the head. One incident of this occurrence is rather humorous. At a ladies' hairdressing establishment, a client was having her hair "permanently waved." She sat for upwards of two hours waiting for the current to return; but at length lost patience, and so resignedly had her hair unwound again. For about a quarter of an hour on the evening of Feb. 6, Central Sheffield was minus its electric supply. The L.N.E.R. Station was in darkness during the busy period; the booking clerks had to issue tickets by candle light, and passengers were piloted along platforms by porters carrying lamps. It is stated that the failure was due to the breakdown of a transformer at the Wicker sub-station. Alleged to have been due to the carelessness of a cat, Shaw (near Oldham) suffered the loss of its electricity supply for an hour last Friday evening. This is the third failure within two months. On examination of a transformer station, the body of a dead cat was discovered. Its wanderings are supposed to have caused a short circuit.

SOUTH METROPOLITAN GAS COMPANY.

Annual Report and Accounts.

The following is the report of the Directors for the year ended Dec. 31, which will be presented at the general meeting next Wednesday.

During the past year sales of gas have been well maintained; and the number of consumers has increased by 4405.

Coal has been purchased at more reasonable prices; and it has been possible, therefore, to make consecutive reductions in the charge for gas. The return from coke and tar has been good; but the fall in the value of ammonium sulphate continues.

Expenditure upon plant, both manufacturing and distributing, has been unusually heavy. Much of the former has been incurred in connection with endeavours to meet the more exigent requirements of coke consumers. The increase in the outlay upon gas-using apparatus has arisen largely from the heavy cost of replacing obsolete stoves.

The agreement with the South Suburban Gas Company, authorized by the proprietors at the last annual meeting, and approved by the Board of Trade, has been duly entered into; and, in accordance therewith, Mr. Harold Gundry has been nominated as that Company's representative on the Board of Directors.

The payment is recommended of a dividend at the rate of 6½ p.ct. per annum, less the interim dividend of 2½ p.ct. already paid. This will permit an allocation of £82,623 to the Employees' Co-Partnership Fund.

In order to make provision for the development of the business of the Company, it will be necessary to raise additional capital. As the balance unissued will be in consequence considerably reduced, the consent of the proprietors is asked to the promotion of a Bill for extending the capital and other powers of the undertaking.

The co-partnership, in its extended application to welfare matters generally, continues to operate to the advantage of the undertaking and its workers. In this connection, it is gratifying to record a sensible reduction in the number and seriousness of accidents, largely, if not wholly, due to the voluntary system in force of holding inquiries into all except trivial cases.

Two Directors, Mr. Frank Bush and Mr. Benjamin R. Green, and one Auditor, Mr. Charles Pelham Crookenden, F.C.A., retire by rotation, and, being eligible, offer themselves for re-election. Mr. Walter A. S. Theobald has been elected an Employee Director in place of Mr. Philip Richbell.

CHARLES CARPENTER,
President.

709, Old Kent Road, London, S.E. 15, Feb. 8, 1928.

The Accounts.

The following are the principal portions of the accounts accompanying the report.

The first two statements relate to the stock and loan capital. The former states that the ordinary capital issued prior to 1916 under the Company's various Acts, on which dividend is payable, is £6,609,895. Under the Act of 1925, £500,000 of preference stock has been issued. The loan capital account shows that the loan capital, the rate of interest on which is 3 p.ct., amounts to £1,895,445; and the redeemable 6½ p.ct. loan capital to £734,000.

The third statement is the capital account, which stands at £9,717,320. The items of expenditure are as follows:

Capital account to Dec. 31, 1926.			£8,996,474 7 1
Expenditure during year to Dec. 31, 1927—viz.:			
Buildings, plant, and machinery	£11,341 1 11		
Mains and services	54,319 8 8		
Meters	14,328 4 6		
Stoves and fires	23,251 19 8		
		103,240 14 9	
Ordinary stock of the South Suburban Gas Company acquired under powers authorized by the South Metropolitan Gas Act, 1925		500,000 0 0	
Total expenditure			£9,599,715 1 10
Balance		117,604 18 2	
Total			£9,717,320 0 0

The net revenue account shows a balance of £251,279 applicable to dividend (after payment of interest and interim dividend).

The balances of the reserve, renewal, and special purposes funds stood as follows on Dec. 31 last: Reserve fund, £234,306; renewal fund, £73,239; and special purposes fund, £123,888.

The balance-sheet gives the values of the stores in hand at the close of the year as follows: Coal, £236,924; coke and breeze, £7295; tar, ammonia, and products, £152,930; sundry plant and stores, £308,903. The figures this time last year were: Coal, £303,709; coke and breeze, £7836; tar, ammonia, and products, £154,937; and sundry plant and stores, £323,683.

REVENUE ACCOUNT.

Expenditure.

To Manufacture of gas—			
Coal into store, including £8335 15s. 3d. for London Port and tonnage dues	£1,715,050 3 5		
Purification	51,687 11 0		
Salaries	81,277 19 4		
Wages (carbonizing)	225,739 4 7		
Repair and maintenance of works and plant, less £10,742 12s. received for old materials	791,983 8 2		
			£2,865,737 6 6
Co-partnership fund			82,623 13 9
Distribution of gas—			
Repair, maintenance, and renewal of mains and service-pipes	£247,026 0 8		
Salaries	113,000 8 10		
Repair and renewal of meters	123,363 15 1		
Repair and renewal of stoves and fires	214,060 13 7		
Repair and renewal of fittings	185,762 6 11		
		883,213 5 1	
Public lamps, labour and materials £68,459 10s. 6d., less £60,781 5s. 7d. received for the same		7,678 4 11	
Rents, rates, and taxes—			
Rents payable	£6,560 5 6		
Rates and taxes	128,988 18 8		
		135,549 4 2	
Management—			
Directors' allowance	£6,483 11 3		
Salaries	32,266 9 0		
Collectors { Ordinary	15,528 17 5		
Collectors { Slot meter	61,534 13 7		
Stationery and printing	26,408 15 10		
General charges	52,800 0 10		
Company's Auditors	500 0 0		
		195,522 7 11	
Miscellaneous—			
Law charges	£1,152 1 3		
Bad debts	2,800 15 5		
Expenses *re* South Suburban Agreement	22,647 4 1		
Superannuation, sick, and accident funds	41,585 6 8		
National Health Insurance	5,231 3 6		
Unemployment Insurance	4,528 18 9		
Co-partnership Insurance Fund	74,821 16 6		
Gas Referees and Official Auditor	914 4 3		
Leasehold renewal fund	2,000 0 0		
		155,681 10 5	
Total expenditure		4,326,006 12 9	
Balance carried to net revenue account		561,969 9 7	
			£4,887,976 2 4

Receipts.

Sale of gas—			
At 10d. and 9½d. per therm	£3,346,508 18 7		
Public lighting	65,692 15 4		
		£3,412,201 13 11	
Rents—			
Meters	£129,551 10 6		
Stoves and fires	151,063 1 2		
Fittings	143,955 12 10		
		424,570 4 6	
Sale of products—			
Coke	£684,122 17 3		
Breeze	1,016 1 7		
Tar and products	297,024 7 9		
Ammonia and products	63,174 8 5		
		1,045,337 15 0	
Rents receivable		5,639 8 11	
Transfer fees		227 0 0	
Total receipts			£4,887,976 2 4

Statement of Coal.

In Store Dec. 31, 1926.	Received during the Year.	Carbonized during the Year.	Used during the Year.	In Store Dec. 31, 1927.
Tons.	Tons.	Tons.	Tons.	Tons.
147,685	1,323,215	1,264,341	1721	204,838

Statement of Bye-Products.

—	In Store Dec. 31, 1926.	Made during the Year.	Used in the Year.	Sold in the Year.	In Store Dec. 31, 1927.
Coke—tons	6,269	766,571	146,172	619,091	7,577
Breeze—tons	3,482	130,371	43,189	88,540	2,124
Tar—gallons	464,513	12,761,218	12,726,764	7,150	491,817
Ammoniacal liquor—butts	8,706	485,441	484,955	..	9,192

Statement of Gas Made, Sold, &c.

Total Made.	Sold.		Total Accounted for.	Number of Public Lamps.
	Public Lights (estimated).	Private Lights (per Meter).		
Therms.	Therms.	Therms.	Therms.	
93,237,253*	2,002,197	87,925,323	91,426,216	25,930

* Includes 314,032 therms purchased from H.M. Fuel Research Station.

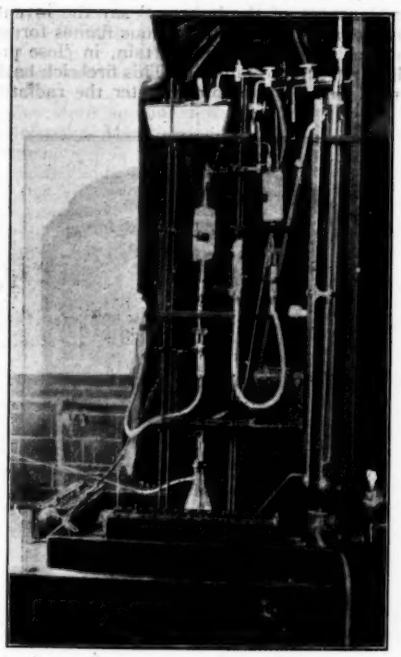
Ensuring Efficient Combustion.—Efficient combustion depends on correct air supply to the fuel. It is difficult, however, to ensure that combustion is being carried out without waste at all times; and for this reason a smoke density meter described by F. Sawford in a recent issue of "Mechanical Engineering" is of interest. A 3-in. iron pipe is mounted transversely across the flue to be investigated. One end carries a standard electric lamp, and a lens to produce a parallel beam of light; and the other end carries a concentrating lens and a photo-electric cell. When the latter is illuminated, a small electric current flows; and this is amplified by a thermionic valve and then measured by a milliammeter. The scale of the latter is graduated. When smoke particles are present in the chimney gases, a certain portion of the light is absorbed before reaching the cell, the current from which is therefore reduced. The indicator then shows the percentage opacity.

A NOTE ON GAS ANALYSIS.

By H. M. STANLEY and A. W. NASH.

The value and importance of a convenient and accurate system of gas analysis for industrial as well as for scientific work is becoming more and more widely appreciated. An excellent apparatus, which is both accurate and applicable to the analysis of gases of the most varied composition and character, is that of Bone and Wheeler (J.Soc.Chem.Ind., 1908, 27, 10). An important modification of this apparatus has been described by King ("Fuel," 1922, 1, 103), who advocates that, after absorbing carbon dioxide, oxygen, olefines, and carbon monoxide with the usual reagents, hydrogen (and surplus carbon monoxide) should be separately estimated by combustion over copper oxide at 280° to 300° C. The paraffin hydrocarbons in the residual gas are then estimated by the usual explosion method.

Details of the manipulation of the ordinary Bone and Wheeler apparatus have been well described by Grice and Payman ("Fuel," 1924, 3, 236).



In the course of recent researches carried out in this Department, large numbers of gas analyses have been carried out on the King modification of the Bone-Wheeler apparatus; and it was thought of interest to record our experience in this matter. The apparatus has been found on the whole eminently satisfactory, giving little trouble and being very easily manipulated after some practice. The only difficulty encountered was in the estimation of paraffin hydrocarbons by the explosion method. The objections to this method have been often discussed, but we may perhaps restate them as follows:

(1) There is a difficulty in arranging the correct proportions of air (or air-oxygen mixture) to give a complete and satisfactory combustion. When dealing with gases of unknown composition it becomes necessary to carry out several trials before the correct proportion of air (or oxygen) to sample is discovered.

(2) Too weak an explosion leads to incomplete combustion, while too violent explosions are also objectionable, since there is a possibility of the formation of oxides of nitrogen, or of the deposition of carbon.

(3) In the explosion of gases containing the higher gaseous paraffins, or a high nitrogen content, it is necessary to use air-oxygen mixtures, or even oxygen itself. This introduces the very real danger of the oxidation of small quantities of tap-grease, with the consequent vitiation of the analysis.

Accordingly we have introduced into our apparatus the further modification of oxidizing the residual mixture of paraffin hydrocarbons by means of copper oxide, heated to about 900° C., in a transparent silica tube, by means of an electric heater. This method of procedure was first recommended by Jäger ("J. für Gasbeleuchtung," 1898, 41, 764) and is still in use in many laboratories, though King (*loc. cit.*) states that this procedure cannot be recommended owing to the high temperature required and the slowness of the reaction. Nevertheless we decided to carry out some comparative analyses on various gaseous hydrocarbons and mixtures of hydrocarbons, using both methods of combustion. The gases used in these experiments were those obtained by the fractional condensation of a gas containing quantities of higher gaseous paraffins (obtained by "cracking" gas oil in an autoclave at 450° C.) by means of the special apparatus, and using the method, of Tropsch and Dittrich ("Brenn. Chem.," 1925, 6, 169). The chief constituents of these gases were paraffin hydrocarbons, but small quantities of nitrogen were also present.

A few typical results are tabulated below. In Columns 1 and 4 are shown the percentage of C_nH_{2n+2} hydrocarbons calculated from the results of the two modes of combustion. The calculated values of n (in the formula C_nH_{2n+2}) are to be found in Columns 2 and 5, while in Columns 3 and 6 we have calculated the volume of CO_2 (in c.c.) produced by the combustion of 100·0 c.c. of the original gas sample.

Type of Gas Used.	Copper Oxide Oxidation.			Explosion.		
	1.	2.	3.	4.	5.	6.
	P.Ct. C_nH_{2n+2}.	n.	CO_2 c.c.	P.Ct. C_nH_{2n+2}.	n.	CO_2 c.c.
(1) Methane . .	93·77	0·992	92·99	94·01	1·018	95·70
(2) Ethane-propane	99·44	2·17	215·3	99·42	2·24	222·5
(3) Propane-butane	96·61	3·47	335·4	94·79	3·64	344·9

We conclude that, even with the most careful manipulation, the copper oxide oxidation method gives somewhat lower results as regards the volume of CO_2 produced from a given volume of hydrocarbon mixture, than the explosion method. Though it is probable that the explosion method is inclined to give results slightly too high on account of combustion of small quantities of tap grease, &c.; it appears that in its final stages, the oxidation of hydrocarbons over copper oxide at 900° C. proceeds rather slowly. In the case of the analysis of gases containing a large proportion of nitrogen, or of gases of unknown composition, we are of the opinion that the copper oxide oxidation process possesses considerable advantage over the explosion method.

The accompanying photograph of the modified Bone-Wheeler apparatus, fitted with the high-temperature copper oxide oxidation apparatus, shows the general arrangement employed in this Department. Another apparatus, also in use, is fitted with the means of explosion analysis as well as of high-temperature copper oxide oxidation.

Department of Oil Engineering and Refining,
University of Birmingham.

Coke-Ovens and Domestic Coke.—We learn that a battery of 59 regenerative coke ovens, designed to carbonize 450,000 tons of coal a year, is to be erected at Ecclesfield, near Sheffield, for the Thorncliffe Coal Distillation Company, which is controlled by Messrs. Newton, Chambers, & Co. The new plant will produce coke of types suitable for both metallurgical and domestic purposes. The Sheffield Gas Company have contracted for the purchase of the surplus gas.

Cornish Association of Gas Managers.—At the annual meeting of the Association held at Truro on Friday, Feb. 10, Mr. S. J. Ingram, of Truro, was re-elected President for another year, and Mr. F. G. Kingwell, of Falmouth, was re-elected Hon. Secretary. Both officers were thanked for their services during the past year. Arrangements were made to hold a District Conference in conjunction with the "B.C.G.A." at Truro in May, and also, in connection with the conference, an exhibition of gas appliances at the Civic Hall, Truro.

Road Tar Exhibits.—The Road Tar Association extend a cordial invitation to all interested in the use of tar for road-making to visit their stands at the British Industries Fair, both in London and Birmingham. The many representatives who will be attending the Carbonization Conference in Birmingham from Feb. 21 to 24 are especially invited to inspect the exhibit in the Gas Section.

Presidency of the British Legion.—The National Executive Council of the British Legion, at a specially convened meeting held on Friday, Feb. 3, acting under the powers conferred upon them by their Royal Charter, unanimously resolved to invite Admiral of the Fleet Earl Jellicoe, G.C.B., O.M., G.C.V.O., to fill the position of President of the British Legion made vacant by the death of Field-Marshal Earl Haig; and further unanimously resolved to submit this recommendation to their Patron, His Royal Highness the Prince of Wales, with the request that he would approach Lord Jellicoe on the matter.

GAS FIRES WITH LUMINOUS FLAMES.

Short-Wave Radiation Combined with Air Heating.

In the "JOURNAL" for March 30, 1927, p. 804, there was an illustrated article on the "Telegas" temperature regulator invented by Messrs. Nell en Stutterheim, of The Hague, the characteristic of which, it is claimed, is its great sensitivity. Mr. P. J. C. Nell has sent us particulars of a new type of gas fire in which the aim of the inventors (Messrs. Nell and Stutterheim) has been to combine the advantages of short-wave

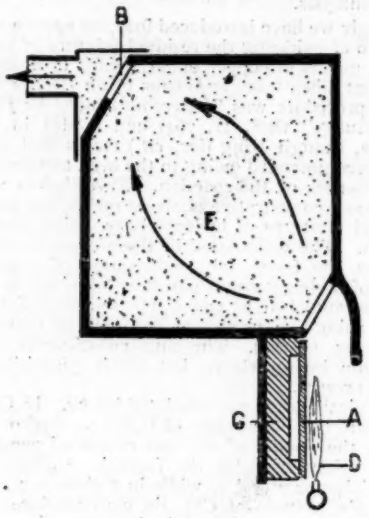


Fig. 1.

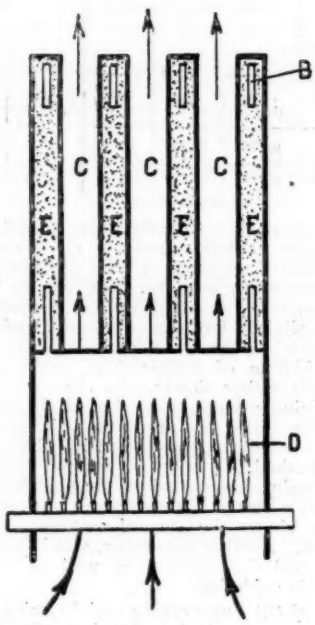


Fig. 2.

radiant heat with the economy of air heating—economy which, they say, is assured if the fire is used in conjunction with the "Telegas" regulator.

The effect of radiant heat on the human body is a question not only of quantity of radiation, but of quality. Short-wave radiation, states Mr. Nell, is far better than the radiation in the red and infra-red portions of the spectrum. The shorter waves penetrate the outer skin and directly warm the blood of the thin arteries, which heat, through circulation of the blood, is transmitted to the whole body. On the other hand, long-wave radiation has a surface effect. It warms the outer skin, and heat passes to the body by conduction—a condition which is inferior to direct transmission. He quotes Prof. Leonard Hill on this point:

> The epidermis reflects and scatters rays which fall upon it. Some part of the visible rays penetrate and are absorbed by the blood beneath, warming it. The dark heat rays, on the other hand, absorbed mostly by the epidermis, warm it more than the blood in the dermis.
>
> Some found that if dark heat rays are brought to bear on the skin up to the just endurable sensation of burning, the temperature just beneath the skin will be raised to about 43° C. On the other hand, if visible rays alone are concentrated on the skin to the just bearable degree, the temperature just beneath the skin will be raised even to 47° C. This result, confirmed by Argyll Campbell and L. Hill, is due to the greater absorption of dark heat by the surface layer of the skin, and a deeper penetration of the visible rays.

The new fire, which is illustrated, employs luminous flames. "The disadvantages of the bunsen," say the inventors, "are thereby obviated." A series of luminous flames forms a curtain of heat; and at the rear of this curtain, in close proximity to it, is a wall of refractory material. This firebrick back is heated by the flames, and as it becomes hotter the radiation from it

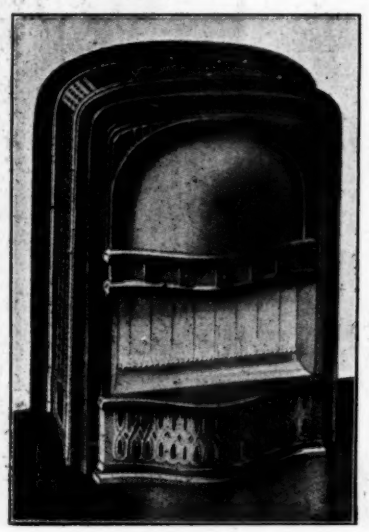


Fig. 3.

increases the temperature of the gas flames, and results in a more intense and whiter radiation.

The construction of the fire will be understood if reference is made to figs. 1 and 2. A row of "one-hole burners" is arranged in front of a wall of special refractory A which is adjusted to the most effective distance by screws. It is positioned some distance apart from a refractory material G, and is held in place by fireproof caps. The patentees state that, as the air can pass only in a well-adjusted and just sufficient quantity between the flame and the wall A, the intensity of the radiation from flame to wall, and *vice-versa*, will not be impaired, and hence a white light and short-wave radiation will result.

The hot products of combustion find their way to the chimney through a system of sectional chambers (Patent No. 255,889) having a large surface exposed to the waste gases. Air flows through these chambers, which are gas-tight, and absorbs heat from the products of combustion.

Fig. 3 is an example of the external appearance of a fire of this design; and it will be seen that it is compact and pleasing. The measurements of this model are 26 in. high by 19 in. wide, and it projects 12 in. in front of the chimney. The gas consumption is 54 c.ft. (approx.) per hour; and the patentees claim an over-all heating efficiency of 85 p.ct. They state that two years' experience of these fires in Holland has well proved their efficacy.

Society of British Gas Industries.—The annual general meeting of the Society will be held at the Hotel Cecil, Strand, W.C. 1, on Thursday, May 17, under the presidency of His Grace the Duke of Sutherland. The annual dinner will take place in the evening. The programme will be announced later.

Fuel Research Technical Paper No. 19.—This paper, by A. B. Manning, Ph.D., M.Sc., D.I.C., J. G. King, Ph.D., A.R.T.C., F.I.C., and F. S. Sinnatt, M.B.E., M.Sc., F.I.C., has been published by H.M. Stationery Office, Adastral House, Kingsway, W.C. 2, at 6d. net. It deals with the "Unsaturated Hydrocarbons in the Gases from the Carbonization of Coal."

INSTITUTION OF GAS ENGINEERS.

Meeting of the Council.

A Meeting of the Council took place on Monday afternoon, Feb. 13, when the following members were present: Mr. H. D. Madden (Cardiff, President), in the chair; Mr. John Terrace (South Suburban, Vice-President); Mr. W. H. Bennett (Redhill), Mr. T. Carmichael (Portsmouth), Mr. W. E. Caton (Oxford), Mr. Harold E. Copp (Hull), Mr. Leonard J. Langford (Tunbridge Wells), Mr. Philip G. G. Moon (Bournemouth), Mr. R. E. Gibson (Liverpool), Mr. Robert Robertson (Bristol), and Mr. W. J. Smith (Bolton) (Ordinary Members of Council); Mr. Charles S. Shapley (Leeds, District Member for the Manchester District); Mr. Francis C. Briggs (Dudley, District Member for the Midlands); Mr. John Wilkinson, O.B.E. (Nottingham), Mr. Charles F. Botley (Hastings), Mr. J. Ferguson Bell (Derby), Past-Presidents; Mr. W. E. Price (Hon. Secretary), and the Secretary, Mr. Walter T. Dunn.

Expressions of regret at absence were received from Mr. C. Rhodes Armitage (British Gas Light Company); Mr. J. H. Canning, O.B.E. (Newport, Mon.); Mr. H. H. Gracie (Edinburgh); Mr. A. T. Kyle (Abergavenny); and Mr. Herbert Lees (Hexham).

A Committee consisting of the President, Hon. Secretary, Mr. C. F. Botley, Mr. E. Fottrell, Mr. P. G. G. Moon, and Mr. C. S. Shapley were appointed to deal with questions arising from the Ministry of Health inquiry into the gasholder accident at Manchester.

It was reported that the President had been elected an Hon. Member of the American Gas Association, and that the President of that Association (Mr. Macbeth) had expressed his cordial acknowledgments of the intimation that he had been elected an Hon. Member of the Institution.

MEMBERSHIP.

The following candidates for membership were approved for the next ballot.

Name.	Position.	Recommendation of Emergency Committee.
BOUCHER, J. A.	Secretary and Manager, Llynvi Valley Gas Company.	Member
COE, J. J.	Engineer and Manager, Arundel Gas Company.	,,
COLVIN, D. J.	Deputy Engineer, Nelson Gas Department.	,,
CORRIGAN, J.	Gas Engineer and Manager, Penrith U.D.C.	,,
CROWTHER, E.	Deputy Engineer and Manager, Bradford Gas Department.	,,
HYDE, J.	Assistant Gas Engineer and Manager, Chesterfield.	,,
HYSLOP, J. L.	Chief Technical Assistant, Belfast.	,,
JONES, J. H.	Gas-Works Manager, Dowlais Gas and Coke Company.	,,
JUBB, A. R.	Engineer and Manager, Melton Mowbray Gas Company.	,,
KAYE, E.	Gas Manager and Secretary, Elsecar, Wentworth, and Hoyland Gas Company.	,,
LEDINGHAM, J. E.	Chief Assistant Engineer, Tottenham District Light, Heat, and Power Company.	,,
LOFTHOUSE, A. G.	Engineer, Manager, and Secretary, Tawe Valley Gas Company.	,,
MOORHOUSE, S. A.	Gas and Water Engineer and Works Manager, Rawmarsh (Yorks.) Gas Company.	,,
MURRAY, L.	Engineer and Manager, Brynmawr and Blaina Gas Company.	,,
PASK, A. E.	Manager and Secretary, Caldicot and District Gas Light and Coke Company, Ltd.	,,
PEARSON, T. B.	Managing Director, Manager, and Secretary, Pontypool Gas and Water Company.	,,
RUST, J. F.	Manager, Crindau Gas-Works, Newport (Mon.).	,,
STEPHENSON, J.	Engineer and Manager, Ferndale Gas Company.	,,
TAYLOR, B.	Engineer, Manager, and Secretary, Quakers Yard Gas and Water Company, Ltd., Treharris (Glam.).	,,
WALKER, S.	Engineer and Manager, Porthcawl Gas Department.	,,
WHITE, F. C.	Engineer and Manager, Blaenavon Gas Company.	,,
WILKINSON, T.	Engineer and Manager, Abercarn (Mon.) U.D.C.	,,

Transference from Associate Membership to Membership.

EDWARDS, E. M.	Assistant General Manager, Holyhead and N. Wales Gas and Water Corporation.	Member
PRINCE, R.	Manager, Heywood Gas Company.	,,

		Recommended for Associate Member
BLYTHE, H.	Assistant Engineer, Colwyn Bay U.D.C.	
BRETTLE, O. S.	Assistant Engineer and Manager, Sedgley U.D.C.	
CHIVERS, R. H.	Assistant Manager, Abingdon Gas Company.	,,
GOODIER, H.	Assistant Engineer, Runcorn Gas Company.	,,
HARRISON, L. W.	Engineering Assistant, Barnsley Gas Company.	,,
HILL, A. D.	Works Chemist, Cavendish Street Works, Derby.	,,
JAMIESON, A.	Engineering Assistant, Blackburn Corporation.	,,
JOHNS, T. V.	Acting Manager, Lowestoft Water and Gas Company.	,,
JORDON, W. J. H.	Chemical Assistant, East Greenwich Works, South Metropolitan Gas Company.	,,
LEYSHON, H. M, E.	Draughtsman, Bradford Corporation Gas Department.	,,
MORRIS, H. B.	Works Superintendent, Loughborough Gas Company.	,,
NICHOLSON, M. R.	Assistant Works Superintendent, Hilsea Station, Portsmouth Gas Company.	,,
OGDEN, G.	Engineering Assistant, Greenbank Gas-Works, Blackburn Corporation Gas Department.	,,
PHILLIPS, S. T.	Special Representative, Gas Light and Coke Company, dealing with Architects, Civil Engineers, and Consulting Engineers.	,,
SMITH, N. S.	Distribution and Sales Superintendent, Luton Gas Company.	,,
SMITH, W. N. H.	Chief Assistant Engineer and Manager, Darwen Corporation Gas Department.	,,
STODDART, C. E.	Shift Superintendent, Oxford Gas Company.	,,
SUMMERSON, J.	Assistant Chemist, Luton Gas Company.	,,
THOMSON, R. F.	On Engineering Staff at Nottingham.	,,
WALLER, C. O.	Engineer's Assistant, East Greenwich Works, South Metropolitan Gas Company.	,,
WHIMSTER, T. C.	Junior Assistant, Waterford Gas Company.	,,
WILSON, M.	Assistant Manager, City of Waterford Gas Company.	,,

ETHERIDGE, W., B.Sc.	..	Student
LAWSON, W. L.	..	,,
RANDELL, J. M.	..	,,
ROGERS, C. W. M.	..	,,
WEBBER, T. M. E. W.	..	,,

DEATHS.

The announcement of the deaths of the following members was received with much regret: Mr. J. McCubbin, Mr. McGilligan, Mr. J. C. Frodsham (Liverpool), Mr. J. T. Battersby (Ambleside), and Mr. J. F. North (Stourbridge).

It was resolved unanimously that Mr. C. S. Shapley, of Leeds, be elected Junior Vice-President of the Institution, arising through the vacancy caused by the resignation of Mr. J. W. McLusky, of Glasgow.

H. E. JONES LONDON MEDAL.

It was resolved that the H. E. Jones London Medal of 1927 be awarded to Mr. Thomas Carmichael, M.I.Mech.E., for his paper on "Modern Carbonizing Economics as exemplified by Results and Working Costs at the Works of the Portsmouth Gas Company."

The report of the Gas for Therapeutic Purposes Committee was presented from the Chairman, Dr. E. W. Smith, and was unanimously adopted for presentation to the National Gas Council with the recommendation that it be adopted.

The Revision of Rules Committee presented their report recommending that steps be taken with a view to applying to the Privy Council for the grant of a Royal Charter. This was adopted, and the Secretary and the Solicitor to the Institution were instructed to proceed with the drafting of the petition, Charter, and bye-laws.

A communication was considered from the British Engineering Standards Association indicating the importance of the Institution appointing two delegates to represent the British gas industry at the session of the International Commission on Illumination to be held in the United States next September.

Mr. Copp was provisionally appointed.

Mr. P. S. Hoyte, of Plymouth, and Mr. C. Carrington Barber were nominated to represent the Institution at the Congress of the Royal Sanitary Institute to be held at Plymouth in July next.

Letters were considered from the British Engineering Standards Association with reference to the standardizing of cast-iron flanges for gas. A copy of the proposed specification was submitted, and was approved by the Council.

It was agreed that the sizes suggested were not intended for gas purposes, and the recommendation of the Association that their use for water purposes be avoided was adopted.

The report of the Finance Committee, including the audited accounts of the Institution for the year ended Dec. 31, 1927, was unanimously accepted and adopted.

Mr. Botley, as Chairman of the Liquor Effluents Research Committee, presented a report of the work done since the last report was issued. It was adopted and recommended to the adoption of the National Gas Council at the meeting of the Central Executive Board to be held on the following day.

The report of the delegates of the Institution (the President and Mr. C. H. Rutter) to the last conference of the Association of Public Lighting Engineers, prepared by Mr. Rutter, was received, and a vote of thanks was passed to him.

On the recommendation of the Education Committee, the following nominations were made: As Examiner in "Gas Supply Practice"—Mr. E. F. Keable, of Gorleston; as Examiners in Gas-Works Practice and in Gas Fitting respectively—Mr. H. C. Smith, of Tottenham, and Mr. R. H. Francis, of the Gas Light and Coke Company. As an additional Examiner in Gas Engineering—Mr. Robert Robertson, of Bristol.

A paper by Mr. S. Barker Johnson (member), of Colombo, on "Gas Supply East of Suez" was accepted for presentation at the forthcoming Cardiff Meeting of the Institution taking place from June 12 to 15, inclusive. It was resolved that the Park Hotel be regarded as the headquarters of the Institution during the period of the meeting. Members would be notified shortly of the preliminary arrangements, and given a list of hotels from which they would select the hotel desired. Early reservation of rooms is essential.

A communication was reported from the Mayor and Corporation of Blackpool for the Institution to hold a meeting at Blackpool on an early occasion. It was resolved that the thanks of the Council be returned, and that the Corporation be requested to furnish particulars of the facilities which are available for such a proposed meeting.

It was agreed that Dr. E. W. Smith be asked to represent the Institution at the Second International Conference on Bituminous Coal, to be held next November in Pittsburg.

An application was considered from the United States Department of Commerce, Bureau of Mines, for an exchange of publications, and was acceded to.

From Sir H. G. Lyons, F.R.S., Director of the Science Museum, South Kensington, a letter was received with statements relating to the developments which are being made in the Science Library offering increased facilities for consulting works of reference, including those dealing with gas engineering. It is open free, practically without restriction, daily from 10 a.m. to 6 p.m. Admission is by ticket to be obtained by application addressed to the Director, The Science Museum, South Kensington, S.W. 7.

A communication was received from the Committee on Rationalization in Great Britain, enclosing minutes of a meeting which was held on Jan. 26 at the Institute of Chemistry, under the Chairmanship of Sir William Mackenzie, G.B.E., K.C.

THE PROPOSED ROYAL CHARTER.

It was decided that a special meeting of the Council be held on Monday morning, March 12, to consider the Royal Charter; and that on Monday, April 2, a special meeting of the Institution be convened for the purpose of submitting the terms of the petition to the Privy Council, the Charter, and Bye-Laws, for the approval of the corporate members of the Institution. For the afternoon, arrangements are being proceeded with for a visit of inspection to the new waterless gasholder at Staines; and, if practicable, to the new £100,000 installation of low-temperature carbonization plant at Richmond, by the courtesy of the Governor and Board of Directors of the Gas Light and Coke Company.

AN ATTRACTIVE WINDOW DISPLAY.

The accompanying photograph is of a window in the Bournemouth Gas and Water Company's showrooms. The lay-out is simple but effective, and is in keeping with the modern idea of attracting notice to one object or class of objects at a time. In this instance it is the new "Mainamel" cookers—"de Luxe" and "Mottled" finishes—to which a passer's attention is drawn. These, simply arranged and set off with some well-designed show cards, make a very fine display, and we congratulate Mr. Phillip G. G. Moon, the Engineer and General Manager of the Bournemouth Gas and Water Company, who is responsible for the very happy result.

Gas-Operated Laundry Appliances.—A Committee of the American Gas Association on Domestic Laundry Equipment, reporting upon the possibilities of building-up a load factor with gas-heated appliances, remark that clean clothes are as vital to human welfare as clean food—vital to the community and to the individual. The cleansing of a garment is a necessity either for sanitary reasons for the health of the individual or as a cheap way of renewal of the fabric. That this cleansing has been drudgery for so long is due less to the inherent difficulty of the work than to the housewives' ignorance concerning labour-saving devices and methods, and to their slowness in improving their methods and in demanding better equipment. As soon as we open our eyes to the opportunities about us for the elimination of drudgery from laundry work, and as soon as we make use of these opportunities, we shall realize the essential dignity of the process whereby our clothes are made clean and healthful; and we shall feel, as we should, that "wash-day" is no longer a despised day, but a day of renewal—the fruit of which is infinitely worth while. It is the belief of the Committee that the gas-heated appliances which make-up the laundry cycle of the average home constitute a fertile held for the building-up of the gas load factor.

DRY OXIDE PURIFICATION.

By NORTON H. HUMPHRYS.

The paper read at the last meeting of the Manchester District Institution of Gas Engineers (see "JOURNAL" for Dec. 14, p. 743) suggests some interesting problems relating to the use of ferric hydrates, supplied in various forms under the generic term of "oxide," as agents for the removal of hydrogen sulphide from town gas; and if the opinions included therein can be substantiated by actual chapter and verse, that process can be efficiently and economically conducted on a much smaller scale, as regards size of boxes, number and thickness of layers, and the tonnage of material on service, than is generally thought by the profession to be necessary or advisable. The author also challenges modern practice as being prejudicial to yields of gas and of tar; and no apology is needed for offering a consideration of the subject at some length.

IN FORMER TIMES.

Elderly gas engineers are not without experiences, which include some of unpleasant character, in connection with small boxes and thin layers of material. Their difficulties were accentuated by inadequate previous treatment of the gas before admission to the purifiers. Foul mains were the exception rather than the rule, condensers were small and not well designed, and when 16-candle gas was the general quality, the liquid treatment was restricted to a minimum because it was thought to remove valuable hydrocarbons. Unfortunately any saving in this direction was lost in the "dry" purifiers by the deposition of a sufficient quantity of tarry matters to act as an efficient solvent. The result was not only loss of illuminating value, but interference with the activity of the oxide, which was frequently rejected not because it was saturated with sulphur or had attained the orthodox 50 p.ct., but because it had become so charged with tar as to be useless. Under such conditions a free use of the hose pipe in the revivifying shed was not in favour, and the thicker layers now in vogue were next door to impossible.

As experiences accumulated, and the makes of gas steadily advanced, a tendency towards boxes of generous size was developed, and strongly supported in Newbigging's "Handbook," King's "Treatise," and other standard text books belonging to a bygone age. Following the introduction of the foul main, of improvements in condensers, and a more liberal liquid treatment encouraged by the current prices of ammonium sulphate, came the practice of getting as much oxide into a box as it would take after making allowance for swelling, and of adding as much water as the material would carry while retaining a light, spongy, porous, and "not sloppy" character. Irish bog ore was especially favoured because it would take nearly 50 p.ct. No question as to the soundness of this recognized practice has previously been met with, or any suggestion of relationship between yields per ton of coal carbonized, and the extent to which watering was allowed in the revivifying sheds.

EFFECT OF GEOGRAPHICAL POSITION.

One claim in favour of the new process is comparative cheapness; and one-fifteenth of a penny per 1000 c.ft. of gas is certainly a low figure. But this by itself is not a proof of superiority. In favourable circumstances, purification has been conducted at a profit after paying all expenses. As with other items of expenditure, the extent of control that is possible is limited by local conditions. Improved methods may be devised, but no more can be done in the way of influencing prices than competent buying and selling. The same applies to quality. Geographical situation cuts both ways and affects both purchase of new and disposal of spent oxide in about the same proportions. One gas-works may be near a seaport and next door to a sulphuric acid plant; another may be 100 miles or more from both. One may have good rail or water connections, extending close up to the revivifying sheds; another may require a mile or two of road haulage and a long run of barrowing in addition to the railway charges. Prevalent climatic and atmospheric conditions must not be overlooked, in view of the fact that temperature has a strong effect on the efficiency of the oxide. It is much more active at 70° Fahr. than at 40°. The dimensions, number, design, lay-out of the purifiers, the area of the revivification ground, and other detail for which the present engineer is not always responsible, will influence the working efficiency and the cost. Obviously the cost of purification must vary widely as between one gas-works and another, through causes that do not come under control.

The most important of the uncontrollable factors is the amount of work to be done, as represented by the hydrogen sulphide content of the gas at the first purifier inlet, which is not a fixed quantity but varies over a wide range according to description of coal used, temperatures, and other conditions of carbonizing. It may be anything between 2 and 20 grains per cubic foot of gas. The quantity of sulphur that must be retained by the oxide may range from 270 to 2700 lbs. per million c.ft. of gas passed through it. Rarely is it possible to confine selection of coal to a low volatile sulphur content; that matter being subject to more important considerations. The use of a material inferior in this respect may be desirable, notwithstanding objections from a purification point of view. Further, a low content can be dealt with at less than the proportionate cost of a high one. In practice, 5 grains of hydrogen sulphide per cubic foot can be removed at considerably less than half the cost of taking out 10.

BACK-PRESSURE.

The connection between yields of gas and tar and such variations in back-pressure as are possible under ordinary and competent working is not obvious. An excess of back-pressure has always been recognized as not only uneconomical, but risky. Now that multi-lift holders comprising four or more sections are used wherever the scale of operations permits, there must necessarily be some degree of variation; but no one has observed that the make per ton is influenced by the height of the holder, or that better results are obtained when the inner lift only is in action, than when the vessel is approaching complete inflation. Yet we are told that the slightest increase in back-pressure will have an appreciable effect on the yields of gas and of tar.

Remarkable features are the small dimensions throughout of the purification plant, and the small tonnage of oxide concerned. A modern plant for producing 120 to 130 million c.ft. of gas per annum would include not less than four boxes, each 20 to 25 ft. square, charged with layers of oxide totalling not less than 3 ft. thick in each box, and a system of valves and connecting pipes which enables the whole to be in operation except during changes. An old-established rule is that with not fewer than three boxes in use, the horizontal section of each shall be not less than the maximum 24 hours make in thousands multiplied by the factor 0·6. Later practice has favoured a multiple of more like 0·9 or 1·0. A plant of the size under consideration would be called on to meet a maximum of (say) 600,000 c.ft. A factor of about 0·7 would mean 20 ft. boxes, 400 sq. ft. horizontal section, a grid area of 3200 sq. ft. on the basis of two tiers to each box, an average thickness of 18 in. per layer, and total oxide thickness of 12 ft. Against this we have two 15-ft. square boxes (a third is only regarded as a check) and a single 12-in. layer in each. This means a horizontal area of 225 sq. ft., a grid area of 450, and a total oxide thickness of 2 ft. The first is about 55 p.ct., the second 14 p.ct., and the third 16 p.ct. On a basis of 50 lbs. per sq. ft., there is only about 10 tons of oxide, while ordinary practice requires 107 tons.

CONTACT TIME.

One would like to know more about the advantage of leaving half the purifier empty, which in practice means doubling the number of changes; and every change is necessarily attended with either waste of gas or depreciation of quality—an important consideration where the official examiner makes periodical visits. And with this is associated the important factor known as "contact time," the number of minutes occupied by any one particular atom of gas in travelling through the oxide, which may be expressed either as per layer, or as a total. Or possibly the rate of travel through the oxide gives a better idea of the facilities afforded for purifying action. Various authorities have fixed an appropriate contact time as 5, 8, or 15 minutes; but all are not clear as to whether the basis is the full or the empty horizontal section of the box. One of the advantages claimed for large boxes is that they afford longer contact time, or, what amounts to the same thing, a slower rate of travel, and consequently a lower back-pressure. With a make of 25,000 c.ft. per hour, the rate of travel through an empty section of a 20-ft. box would be about 1 ft. per minute. Assuming that oxide occupies two-thirds of the space allotted, one-third remains as interstices admitting passage of gas; and the rate of travel will increase in like proportion. It will therefore pass through one layer 18 in. thick in half-a-minute, or through the whole eight in four minutes. Applying the same method to the Barnoldswick working, the rate of travel is nearly doubled. The contact time with a 12-in. layer is only about one-sixth of a minute for one, and one-third for the total of two layers.

As less than 2 p.ct. of air is admitted, the sulphur content of the gas at the first inlet is presumably low; the usual rule being not less than 2½ p.ct. of air (½ p.ct. of oxygen) for each 1 p.ct. of hydrogen sulphide. The cycle of operations as described would hardly be possible in other circumstances. A layer of oxide 15 ft. square and 1 ft. thick, taken to weigh 50 lbs. per c.ft., would include about 5 tons. On an average of 4¼ million c.ft. (128 ÷ 30), and the minimum of 270 lbs. sulphur per million, we get an absorption of 10 cwt., equivalent to an addition of 10 p.ct. on a charge, or a smaller proportion in terms of the foul material. On a moderate 1080 lbs. per million, we get an addition of 20 cwt. of sulphur per charge; and the material should contain more than 50 p.ct. after three charges.

Another surprise is the statement that dry oxide (2½ p.ct. moisture) is an excellent dehydrator, reducing the usual 2 p.ct. in gas at ordinary temperatures to the extent of 0·3 to 1·0 p.ct.

Somewhat elaborate processes, including the use of chemicals, circulating pumps, mechanical scrubbers, and evaporating plant, which have been recently introduced claim to reduce the moisture content some 60 to 70 p.ct. The best results with dry oxide run it close, and suggest that a little further research may elucidate a simpler process for dehydration.

MOISTURE CONTENT.

The percentage of moisture in oxide, accepting the expression in the usual sense as a conventional term for free or uncombined water, is an uncertain quantity dependent on the methods by which it is ascertained. Oxide dried at 220° Fahr. until a constant weight is obtained will give a result different from that shown by drying at ordinary temperatures in a desiccator. That 1 c.ft. of material ready and fit for the purifier consists of 25 lbs. of oxide and a similar weight (2½ gallons) of water seems incredible. Latterly the fashion has been to regard the iron content of oxide as taking the form of the mono-hydrate; but a di-hydrate and a tri-hydrate are also known, and the latter is the formula commonly accorded to ordinary rust. The respective formulæ and percentages of water combined are as follows: Mono-hydrate ($Fe_2O_3H_2O$), 11¼ p.ct.; di-hydrate ($Fe_2O_3 2H_2O$), 22½ p.ct.; tri-hydrate ($Fe_2O_3 3H_2O$), 33¾ p.ct.

The hydrates are unstable, and easily decomposed by heat; only the mono-hydrate being capable of resisting a temperature of 212°. An explanation following the introduction of oxide was that in Irish bog ore and other kinds capable of retaining 40 to 50 p.ct. of water, a large proportion was actually combined in the form of the tri-hydrate. A reasonable proposition is that the free water does not exceed limits of 10 to 15 p.ct., and that any excess above these limits is combined. The presumption was also that the fullest possible degree of hydration was desirable—*i.e.*, that the tri-hydrate was the most active form, and that one reason for using the hose pipe freely during revivification was the promotion of conditions favourable to its formation.

Any question as to the quantity of water added to or removed from the oxide by the current of gas, apart from the special dehydrating property above mentioned, is entirely a matter of temperature. If the gas comes in hotter than it goes out, a known quantity dependent on the difference in temperatures is deposited; and a reverse action follows a rise in temperature as between the main inlet and outlet. Heating during revivification *in situ* may be the means of transferring moisture from one place to another.

Though the material may go into the purifier containing not more than 2½ p.ct. moisture, it cannot be long in use before that small proportion is appreciably increased. For every pound of sulphur deposited, ½ lb. of water is set free, and probably some of the combined water of hydration in addition. Yet it is remarkable that as a rule the oxide comes out apparently drier than it went in, and that a free addition is made during each revivification. This refers to the ordinary practice. One would like to know the water content of the "2½" brand when it came out, and whether the natural heat of revivification was sufficient to restore the desired condition without resort to artificial heat.

The object commonly in view is to avoid frequent changes, and especially night work, in the purifier house. A change of valves every hour, day and night, requires a reliable and methodical man in charge; and his duties are not enviable, especially during cold spells such as the recent one. Many will prefer to retain their present methods, which have been already brought down to a fraction of a penny, rather than seek to go one better by the aid of a process that includes 30 changes per annum, and attention every hour.

The writer does not claim special knowledge other than the accumulations of some half-century's practical experience; and the statements included in the foregoing are intended to be suggestive rather than authoritative. The various chemical and physical reactions concerned are worth exhaustive investigation (say) at the Leeds University, and offer promising material for a thesis for candidates for the Institution Diploma.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Inspection of the Sutton Gas-Works.

For the first time in their history, the London Juniors visited the Sutton Gas Company on Feb. 11, when, after assembling at the new showrooms of the Company, which were described and illustrated in the "JOURNAL" for Dec. 7, 1927, p. 676, they made a detailed inspection of the works, which provided many items of interest. The visitors were greatly impressed by the capable manner in which the Company are coping with their business—not only from the point of view of gas manufacture as such, but also from the aspect of efficient service.

A RECORD OF ACHIEVEMENT.

The genesis of the Company, in 1857, was a modest one. At that time Sutton was a village with hardly two thousand inhabitants and with very few streets. Three retorts were laid down on an acre of land in High Street, and storage was provided for 5000 c.ft. The mains had a total length of two miles, and the undertaking was launched under the title of the Sutton Gas Light and Coke Company. From this tiny beginning there has grown up a large undertaking which in every respect is up to date. The 450-million mark has been passed, and gas is conveyed to 11,000 consumers through 85 miles of mains. To meet this demand the Company need 36,000 tons of coal, all of which is conveyed from Wandsworth by road, for there is no railway siding at the works. Instead of three small retorts stoked by hand, the works to-day contains 112 retorts mechanically charged and discharged, while the coke is mechanically removed, broken and graded. The gas storage capacity is 1,250,000 c.ft.

Messrs. E. J. Holland, D.L., J.P. (Chairman of the Company), Henry Gage (Engineer and Manager), H. W. Carpenter (Secretary), P. T. S. Kitto (Assistant Engineer), and J. Davis (Distribution Superintendent) acted as guides during the tour of inspection. The visitors were greatly interested in a new 1 million Humphreys & Glasgow carburetted water gas set, which was installed last year, and brought into operation in November; the manner in which Mr. Gage has extended the meter house, installing a 100,000 c.ft. per hour Braddock station meter, to replace one having a capacity of 30,000 c.ft.; and a new messroom for the men. Afterwards the visitors were entertained at tea.

EXCELLENT PROGRESS IN 1927.

The CHAIRMAN said how glad he was to have the opportunity of welcoming the Association to Sutton. The Sutton Gas Company, he remarked, was commenced a little over seventy years ago, and had reached its present position by stages. Throughout, the undertaking had been in the hands of people who knew what they were doing; and it had always been possible to build on sure foundations. In relation to the output of gas, capital had been spent most carefully; and to-day, even after considerable outlay on reconstruction and extension work, both in the manufacturing plant and on the district, the capital still stood at the low figure of £500 per million c.ft. During the past six or seven years the works had been greatly improved; and it was good to tell them that the output during that period had increased by 50 p.ct. The year 1927 had proved exceedingly satisfactory—certainly the best year since he had been associated with the Company. The reasons for this were not far to seek. During and after the war, there were many difficulties; and just as affairs appeared to be getting bright again, came the disastrous coal strike in 1926. However, at the beginning of 1927 they were in the fortunate position of having no forward contracts for expensive coal. Throughout the year the markets had been stable, and they had been able to purchase coal at a reasonable price. The result of the year's working was an increase in sales of 40 million c.ft., or 9 p.ct.; and the price at which they now sold their gas was only 9d. per therm. Considering their circumstances, he thought they would agree with his statement that this was a highly satisfactory figure. Mr. Holland remarked that, since he had been intimately associated with the Company, there had been two Engineers—the late Mr. Stephen Carpenter, who was the brother of their present Secretary, and their present Engineer, Mr. Gage. He (the speaker) thought it was fitting that on the present occasion he should congratulate Mr. Gage on the way in which he had reorganized the works to cope with present and future needs. Concluding his remarks, Mr. Holland referred to the new showrooms of the Company, which, he observed, had already proved themselves a great asset.

Mr. LEONARD LACEY (President of the Association) congratulated Mr. Gage on the many improvements he had effected on the works, and also on what he (the speaker) described as their serene atmosphere. The tidiness of every detail of the plant—a cleanliness which connoted efficiency—was more than praiseworthy.

THANKS OF THE ASSOCIATION.

Mr. W. T. KENSHOLE (Lea Bridge Gas Company), proposing a vote of thanks to the Chairman and Directors of the Sutton Gas Company, and to the Engineer, the Secretary, and the other guides who had made their visit such a success, remarked on the fact that the Company were as anxious to ensure good service to their consumers as they were to manufacture a good gas. The new showrooms, he said, were excellent.

The vote was seconded by Mr. S. D. BELLINGHAM (Gas Light and Coke Company), and responded to by Mr. GAGE and Mr. CARPENTER. In his reply, Mr. GAGE spoke of the helpful spirit of co-operation which prevailed throughout the staff and workmen of the Company, and of the considerate manner in which the Directors dealt with any proposal he might put before them. It was due to these two factors that his six years of office as Engineer and Manager had been so happy and so satisfactory.

GLOVER-WEST VERTICAL RETORTS FOR WARSAW.

A contract has been placed with Messrs. West's Gas Improvement Company, Ltd., Manchester, for the construction of an installation of Glover-West vertical retorts of a daily capacity equivalent to 4 million c.ft. The contract includes extensive coal and coke storage and handling plant capable of dealing quickly with large seasonal supplies of, and demands for, these materials.

The installation will be complete with waste-heat recovery plant of the type which is now usually installed with Glover-West verticals in this country. It is interesting that the contract has been secured in the face of keen competition, and that the guaranteed results have been based upon tests carried out by Messrs. West's Gas Improvement Company's technical staff in their research gas-works at Miles Platting; a consignment of 30 tons of Polish (Silesian) coal having been specially sent over to England for this purpose.

THERMAL STORAGE IN INDUSTRY.

Steam Accumulator Systems.

At a Meeting of the Institute of Fuel held at Burlington House, W. 1, on Feb. 8, Mr. STANLEY HOPKINS presented a paper on "The Use of Thermal Storage in Industry." Having referred to the work of Halpin and Rateau on this subject, the author went on to discuss the system of Ruths. This, said Mr. Hopkins, was based on the idea of taking the steam produced during low-load periods, and passing it into a tank about nine-tenths filled with water, where it condensed under rising pressure. During peak-load periods it was allowed to boil off under falling pressure, for process or power purposes.

With Ruths' system it is, of course, a necessary condition that there shall be low-pressure users whose requirements are sufficiently large to take-up the steam stored. If there should be a large amount of steam delivered at various times from (say) a back-pressure engine in excess of that required by the low-pressure users, and it cannot be employed subsequently, a condensing set might be necessary. On the other hand, if the demands are for steam at one pressure only, and there is no margin for a difference in pressure between the intake of the accumulator and its exhaust, then the Ruths accumulator is unsuitable. However, given the condition of a low-pressure demand and a fluctuating load, Ruths' system is usually applicable. It does not follow, of course, that the fluctuations must only be on the low-pressure side. If there is a peak on the high-pressure side of a high-pressure and low-pressure system, the supply of steam from the accumulator can go to meet the low-pressure requirements, thus relieving the boilers of the low-pressure demand, and allowing the whole of their production to deliver temporarily—within the limits of the contents of the accumulator—into the high-pressure main.

CONSTANT-PRESSURE SYSTEMS.

Thermal storage, said Mr. Hopkins, has also developed along the lines of constant pressure—*i.e.*, instead of the steam being available at a lower pressure than is produced by the boilers, the latter and the accumulator are kept at the same pressure, and if low-pressure steam is required, it is passed through either prime mover or reducing valves. This system, due to Halpin, and developed by Kiesselbach, relies on the difference of temperature of the normal feed water and the temperature of the steam in the boiler. Instead of the heated-up water being allowed to give off steam under falling pressure, or absorb it under rising pressure, it is used for boiler feed, and only so much water employed as will take up the available heat. The steam during low-load periods is used for heating up the feed water for consumption during periods above the average.

BENEFITS OF THERMAL STORAGE.

The benefits obtained by thermal storage include the even firing and complete combustion of the fuel, economy in boiler heating surface, increased output of manufactured product, and the lowering of cost of production.

Mr. Hopkins mentioned that a number of installations have been made where the accumulator is used for taking charge of the steam produced by electric boilers. However, unless the current is supplied below 0·2d. per unit, it does not pay to produce steam by electricity. The author stated: "It appears that there will be a substantial development in this and other countries along the lines of storing steam during low-load times and using it for electricity generation."

CONDITION OF BOILERS.

Towards the end of his paper, Mr. Hopkins observed that important results have been obtained with the circulating system of thermal storage in respect of the condition of the boilers. The water level in the latter is kept constant, but the contents of the accumulator are circulated at the rate of about 5 ft. per second. Working has shown that the solids contained in the water do not settle on to the surfaces in anything like the degree they would without this auxiliary circulation. Careful examination has been made of the condition of two batteries of boilers running together, but with one coupled to a steam accumulator, and the other free. The one with the accumulator maintained clean surfaces for over four years, while the other battery required cleaning and scaling every few weeks.

HIGH-TEMPERATURE SEMI-COKE.

The Roberts Process.

Realizing the advantage—perhaps in the future the necessity—of marketing a satisfactory smokeless solid fuel able to meet and fully satisfy the demands of the domestic consumer, the gas industry is paying much attention to its production. Admittedly a gas-works is not a coke works; but if by simple and inexpensive modification of the carbonizing process which does not interfere with the gas undertaking's main object—the manufacture of gas—it is enabled to market a readily ignitable smokeless fuel, the gain will be very great indeed.

It does not follow that the only method, or even the best means, of producing a smokeless fuel for domestic purposes both in open fires and in hot-water boilers is by the low-temperature carbonization of coal. This fact was evident when recently we had the opportunity of inspecting some really excellent high-temperature semi-coke produced in gas-works. The fuel was in a condition suitable for transport, could be ignited with commendable ease by the ordinary method of paper and wood chips, and, burning in an ordinary grate, gave a fire which even the most hardened coal-burning enthusiast ("sinner" would be a more fitting phrase) could not criticize. Though, apart from general observation, we had no means of ascertaining the radiant efficiency of this semi-coke fire, there can be no doubt that it was superior to coal.

This semi-coke was produced by the Roberts process in the Woodall-Duckham intermittent chamber ovens at Ramsgate; and it is interesting that the smokeless fuel was burned for four days in the Royal Hotel, Ramsgate, with eminently satisfactory results. The process, which will be described, is suitable for static but not for moving charges. In other words, it is applicable to those works where horizontal retorts, intermittent verticals, or coke ovens are installed, but is not suitable for continuous verticals.

For a moment let us regard the theory of the process. Mr. John Roberts has pointed out that the elimination of the plastic layer in the carbonizing process, by blending strongly-coking coal with non-coking coal or with coke dust, accelerates gas production and prevents over-coking of the charge. In this connection most of our readers will recollect the astonishing results which Mr. E. V. Evans, Chief Chemist to the South Metropolitan Gas Company, presented in his Cantor Lectures of 1924—see "JOURNAL" for Feb. 24, 1924, p. 483 *et seq.* Mr. Evans demonstrated some highly interesting "ox-tongue" thermal models showing the amount of useful work effected during each hour of the carbonizing period. The work effected in the last two or three hours of the carbonizing period was small in comparison to that done in the early stages. This effect was greatly augmented in the case of carbonization of coal-coke mixtures. Mr. Evans showed that the admixture of an inert material with coal increases the rate of gas evolution.

The process of Mr. Roberts is to blend non-coking with coking coal, and shorten the carbonizing period (at high temperature), leaving a small percentage of volatile matter (between 3 and 8 p.ct.) in the coke. True, the yield of gas per ton of coal carbonized is slightly less than in the normal gas-works method of carbonization, but this is amply compensated for by increased throughput per retort and a much more saleable coke. For the semi-coke we examined, a typical Yorkshire coking coal was blended with a high-oxygen coal which was practically non-coking. A high-oxygen coal is, in fact, essential to the process—a factor of financial importance to gas undertakings and of national importance as well.

From the gas industry's point of view, the process has the merits of being simple and inexpensive and does not affect the high-temperature carbonizing method as at present operated. Further work will be awaited with interest.

Wills.—Mr. William Dickens Harvey, of Bedworth, Warwick, a Director of the Bedworth Gas and Coke Company, Ltd., left estate of the gross value of £7469, with net personalty of £7310. Sir Arthur Francis Pease, Bt., D.L., J.P., of Middleton Lodge, Middleton Tyas (near Darlington), for some years Chairman and Managing Director of Pease & Partners, Ltd., who died on Nov. 23, left unsettled property of the gross value of £113,971, with net personalty of £103,765.

Gas at 3½d. per Therm.—Some time ago a pamphlet was issued, in Scotland, on "Can Gas be Manufactured and Sold at 3½d. per Therm?" It was by Mr. George Helps, and was published by the Scottish Citizens' Union, of Glasgow. A reply has since been prepared by the Gas Industry of Scotland, and has been published in pamphlet form. Copies of the latter are available for distribution at the offices of the "JOURNAL," and can be obtained therefrom at 3d. per copy, or by post 4d.

WESTERN JUNIOR GAS ASSOCIATION.

A Meeting of the Association was held at Bath on Jan. 7, when the members were conducted round the Bath Gas-Works, and shown the many improvements which have recently been carried out. These include a new horizontal retort house with Drakes settings and combined charging and discharging machine; a conveying plant of the chain type feeding into a grading and screening plant and storage hoppers; a commodious engine house; and a new 3¾ million c.ft. holder.

Following the inspection, the party were conveyed from the works to the Company's showrooms in Cheap Street, where they were entertained at tea by the Bath Gas Light and Coke Company.

Afterwards, the PRESIDENT (Mr. Arthur Marsden) welcomed one of the Association's Honorary Members—Mr. J. W. Whimster (Engineer and Manager of the Bath Gas Company).

The SECRETARY (Mr. G. C. Gunston) spoke of the Prize Scheme which had last year been put into operation. The Honorary Members, in conjunction with the President, acting as the adjudicators, decided that the best two papers read during Session 1926-27 were in the following order:

(1) Mr. A. Marsden.
(2) Mr. S. Hole.

These gentlemen were consequently awarded the first and second prizes respectively.

WATER SOFTENING.

By W. L. ASHMAN, of Bath.

[EXTRACT.]

The amount of dissolved material in a feed water, when considered as a percentage by weight, may seem small. Take, for example, a water which contains only 0·05 p.ct. of dissolved matter. This would give 5 lbs. of impurities per 1000 gallons. It would not necessarily be correct to say that this would give 5 lbs. of scale per 1000 gallons, as all the impurities may not be scale-forming. But all this has to be dealt with, either as scale or sludge; and even with a water 99·95 p.ct. pure, the scale and sludge would be considerable with a boiler installation using many thousands of gallons per day.

The fact that a water is a "soft" water does not necessarily mean that the total percentage of the dissolved impurities is low. It means that the percentage of scale-forming impurities is low.

If we consider a water with a hardness figure of 22, which is common with the water we use at Bath, which is obtained from the River Avon, this water contains 22 grains of scale-forming matter per gallon. Taking a boiler using 10,000 gallons of water a day, which is an average figure for some of our Thompson boilers, 220,000 grains of scale could be deposited per day under suitable conditions. Whether all this would be formed, it is impossible to say, since temperature, pressure, and concentration of the water in the boiler—and hence the frequency with which the boilers are "blown down"—all play a part. For example, Na_2SO_4 under high pressure and at high temperature is insoluble, and deposits as scale, while at low pressures and low temperature it dissolves. Hence when a boiler is let-down for cleaning, this scale may be dissolved off the plates; but the amount so removed cannot be estimated, because much of it would be covered with insoluble scale.

Assuming, however, that all the above were deposited as scale, there would be approximately 31·3 lbs. of scale formed per day; and as the specific gravity of the scale is about 2·51, the volume of scale would, at the end of three months (90 days), which is the usual period of running between cleaning, be about 18·17 c.ft. The bulk of the scale would be deposited on the fire tubes. Assuming for the sake of calculation that it were deposited evenly on all the water-covered parts of the boiler, it would represent a thickness of about 0·2 in. Considering the absolute conductivity of scale to be 0·0035 C.C.S. units (approx.), or about $\frac{1}{40}$ that of iron, the loss of fuel due to this scale will be considerable. Prof. Rankine has estimated that with:

Scale.		Extra Fuel Used.
$\frac{1}{32}$ in. thick	..	16 p.ct.
$\frac{1}{16}$ in. ,,	..	50 ,,
$\frac{1}{8}$ in. ,,	..	150 ,,

Assuming the boiler is clean to start with, and there is an average thickness of scale over the three months of $\frac{1}{16}$ in., and taking an approximation between the above figures for this thickness, we see that the extra fuel used would be at least 20 p.ct. As the fuel used per three months per boiler is 705 tons when clean, the extra fuel would equal 141 tons, or 564 tons per year per boiler.

In addition to this, owing to the low conductivity of scale, the deposit in the boiler necessitates the raising of the temperature of the boiler plates to a much higher degree than would otherwise be necessary. It has been found that with scale $\frac{1}{2}$ in. thick, in order to keep water at a pressure of 100 lbs. per sq. in. boiling, it is necessary to keep the plates at 700° Fahr., while with clean plates 350° Fahr. is ample. Apart from loss of fuel and unequal expansion, due to this temperature, of the parts that are scale covered, the steel itself is more readily oxidized at high temperatures, and there is also a tendency for the plates to be rendered granular and brittle above 600° Fahr.

Boiler tubes that have worn thin have been known to get so hot, due to the heat-resisting scale deposit, that they have burst with the pressure of the steam inside. Again, there is the expense and inconvenience of continually shutting-down a boiler for several days for cleaning, besides the wear and tear due to chipping-off the scale.

CORROSION.

In untreated waters there is the risk of corrosion. In addition to magnesium chloride, which has been mentioned, and which may be present, or formed by interaction, there is calcium nitrate, which is highly corrosive, and also sodium and magnesium nitrates, which, though not so corrosive as the calcium salts, are still objectionable, though these salts are usually only present in very small quantities. Also iron and aluminium salts are liable under boiler conditions to give rise to free acids, and there may possibly be traces of free acids in the water.

Having mentioned the "Permutit" process of water-softening, the author called attention to a French process, introduced by M. Chevalet. This consists briefly in adding ammonium hydrate to the water, in a type of softener plant, when the following reactions take place:

$$2NH_4\,OH + CaH_2(CO_3)_2 = Ca\,CO_3 + (NH_4)_2\,CO_3 + 2H_2O$$
$$(NH_4)_2\,CO_3 + CaH_2(CO_3)_2 = Ca\,CO_3 + 2NH_4\,HCO_3$$

at 60° C. the ammonium bicarbonate is broken down:

$$2NH_4\,HCO_3 = (NH_4)_2\,CO_3\,CO_2 + H_2O$$
$$(NH_4)_2\,CO_3 + H_2O = 2NH_4\,OH + CO_2.$$

Hence the ammonium hydrate acts as a catalytic agent.

Mr. Ashman then described in detail the lime-soda process, as used in the Paterson water softener. The Paterson process can be operated cold or hot; the main difference being that while in the cold type the reagents are mixed with cold feed water, and the whole process is carried out at ordinary temperatures; in the hot process use is made of exhaust steam to heat-up the water during the softening process. The heat assists in the softening and in the precipitation of the insoluble salts. It has also the advantage of supplying a relatively hot feed water, about 110° Fahr., which is a great advantage in boiler work, and especially so when an economizer is used, since cold water supplied to an economizer causes condensation of the flue gases on the outside of the inlet pipes, with consequent pitting and corrosion, due to weak acids—*e.g.*, H_2CO_3 and H_2SO_3.

With the Paterson plant described, steam is used from turbines; and hence there is no risk of oil getting into the plant. With a further plant, exhaust steam from pumps, compressors, and exhausters is employed; and it is necessary to remove the oil contained by some form of filter. At Bath an oil eliminator containing wire gauze in layers is used, so that, as the steam passes through, it is "wire drawn" as in a "P. & A." tar extractor, and all the oil removed. The oil collects at the bottom of the eliminator, and is automatically syphoned out with any condensed steam which may collect.

The need for oil removal will be realized when we consider that the resistance to the passage of heat of a film $\frac{1}{1000}$ in. thick is equal to that of a 10-in. steel plate. Also, oil tends to thicken the water and increase the resistance to the escape of bubbles of steam as they are formed, thus resulting in an almost continuous layer of steam round the furnace, and overheating and buckling.

In some instances the feed water at a works needs to be filtered before passing to a softener, on account of the suspended matter present. A form of pressure filter as made by Messrs. Paterson is very suitable; selected sand and gravel forming the filter. Little room is taken up by this apparatus; one square foot being the area of a plant passing 130 to 150 gallons per hour. When the filter becomes dirty, it is cleaned quickly by a reverse current of water or by agitation with compressed air in conjunction with a back current of water.

With the Paterson plant at Bath which is operated hot and used in conjunction with an economizer, there is a great saving due to raising the temperature of the water, as shown below:

Gallons of water	5,140,000
Lbs. of water	51,400,000
Inlet temperature to softener	53° Fahr.
Outlet temperature of softener	115° Fahr.
Rise in temperature	62° Fahr.
B.Th.U. saved	= 3,186,800,000 per annum

Assuming a C.V. of breeze = 10,500 B.Th.U. per lb., and a boiler and economizer efficiency of 60 p.ct., the saving in fuel is 226 tons. At 16s. per ton, this equals £161 (in addition to the saving of fuel as shown above, due to scale prevention). Moreover, hot water is supplied to the economizer.

It is not possible to estimate the saving due to the longer

life of the boilers, and the saving of the expenses that would have been necessary for cleaning them.

There are a few points to be noted where we have had a marked improvement, due to the use of softeners, apart from the question of the boilers themselves.

(1) *Economizer.*—The tubes were frequently filled up with $CaCO_3$. I have seen them almost solid, and they have had to be drilled out. However, with new tubes, after twelve months' working, the scale was only about in. in 3 in. tubes—and this a very soft and easily removed scale.

(2) The relief valve of the economizer was frequently choked, due to the deposit of lime, and had to be regularly cleared. Now it goes for months without needing to be taken out.

(3) Injectors to the boilers were frequently choked with lime.

(4) The feed water pipes to the boilers were frequently choked up, due to the deposit of $CaCO_3$ from the hot feed water from the economizer, and the boilers often had to be shut off for an hour or so to allow the pipes to be cleared sufficiently to continue working until the boilers could be let-down for complete scaling. Now, after six months' working, the feed pipes are only scaled like the economizer to about $\frac{1}{4}$ in.

In our case, therefore, the softeners have much more than proved their worth.

Discussion.

The PRESIDENT stated that, with a lime-soda softening plant, trouble usually arose due to lack of water-settling space. With the French process mentioned, it would seem that the ammonia would get away. In the ordinary treatment of feed-water, some iron was usually found, and was not removed. A more detailed statement as to the costs of the plant was asked for.

Mr. C. G. HAYNES (Bristol) inquired what were the degrees of hardness of the softened water.

Mr. J. MALSBURY (Weston) remarked that with the water at Weston, the hardness varied hourly, so that the lime-soda process would be practically useless for them.

Mr. C. BATEMAN (Bath) stated that working costs of the plant would be given at the next meeting.

Mr. ASHMAN said that the hardness of the water was reduced from 20° to 22° to about 2°.

THE FUTURE OF THE GAS ENGINE.

By H. C. FELTHAM, of the Bath Gas Light and Coke Company.

[EXTRACT.]

The modern gas engine is very reliable, simple, and easily understood, and such minor stoppages as are in the least likely to occur can usually be diagnosed and tackled by the average mechanic. It is not likely to be seriously damaged in the event of a sudden overload. On the other hand, it is comparatively inconvenient to instal and operate. To my mind, the conventional type of small gas engine lays itself open to much criticism on this score.

Engines of low and medium power are both large and heavy for their output. The makers appear reluctant to break away from their practice of using massive iron castings for bed plates and water jackets. The working parts are usually exposed; and so that the engine may have a maximum life, it has to be housed in a clean engine room away from the influence of dust and grit. The cooling systems adopted, though efficient as such, are by no means all that could be desired in the way of compactness. The intimation to a possible gas power user who has his eye on an electric motor, that he will need to instal a water tank with necessary connections, will not improve the situation.

Again, this type of engine, being of only one or two cylinder design, and having heavy reciprocating parts, is difficult to balance, and needs elaborate foundations. For the same reason, coupled with the fact that it runs slowly, a heavy flywheel has to be fitted to give an even torque.

A possible solution to these disadvantages lies in the adoption of the small multi-cylinder engine running at a comparatively high speed. Such an engine could be made much smaller for a given power output, would be much lighter, would be easy to start, would be totally enclosed, and could have a forced feed lubricating system to all bearings, rendering it entirely self lubricating. Cooling could be made a closed system utilizing some compact form of radiator. Balance would be much improved, and the need for massive foundations reduced in proportion. Pulsation due to intermittent suction on the gas supply would be reduced to a minimum. The whole could readily be made a dust-proof and compact unit, requiring no special engine room, and would work in a square corner of a workshop, or if necessary, in the case of the very small sizes, under a machine. In brief, it would be a gas meter rather than a gas engine.

The first objections likely to be advanced is that high-speed machinery is unreliable, has a short life, and needs constant attention; but in face of the large advances made during the last few years, this line of argument does not carry much weight.

I do not suggest that jumping to the extremes adopted by automobile designers with regard to diminutive size and high rate of revolution would be necessary or desirable; but some convenient compromise would give what is desired. I am of opinion that there is a definite need for engines of medium and low power which are both smaller and lighter than those generally in use to-day.

Having cited an example of a small multi-cylinder gas engine used in connection with a country house electricity generating set, the author observed that it is debatable whether the utilization of gas for the generating of electrical energy is a desirable process from the point of view of the gas engineer. In many cases it would appear to have points in its favour. This is especially so in large cinemas and other premises where electricity is already installed. The managements of many of these concerns have discovered that by using gas power they are able to generate their electricity at a lower figure than it can be supplied to them by the local undertaking. The gas undertaking thus obtains a useful load, otherwise lost.

Mr. Feltham then spoke of the Michell crankless engine, which was described and illustrated in the "JOURNAL" for Aug. 17, 1927, p. 385. Following this he discussed the subject of maintenance. Whatever points are brought forward for and against maintenance systems, he observed, it appears that where gas engines are concerned, special efforts, and, if necessary, concessions, should be made. A gas engine, being mechanical, naturally requires more attention than other gas appliances, and should therefore merit separate consideration.

In cases where an engine is known to be working under bad conditions, or neglected, it is not advisable to allow the state of affairs to continue unquestioned. A badly-conditioned engine is bound to become expensive to work, and unsatisfactory in every way, and thus a very undesirable advertisement. A customer is usually most ready to receive advice concerning the methods by which he may obtain the best results from his engine. Sometimes he is ignorant of the treatment an engine should receive; and in such cases a little friendly advice, given by a representative of the gas undertaking, will do much to create a good impression.

In instances where the first cost of installation would actually prove a deciding factor in the adoption of another form of power, an enterprising gas undertaking might obtain the load by means of a hire-purchase, or even a simple hire, system. Electric motors may be had on hire; and I see no real reason why gas engines could not be hired in the same way.

In conclusion, an impression I have received is that the large-scale utilization of electric power in gas-works, not always generated by means of gas engines, is proving rather a set-back to the outside adoption of the gas engine.

Discussion.

The PRESIDENT remarked that attention should be paid to the design of exhausts of existing gas engines, with a view to minimizing the objections to their use in confined areas.

Mr. H. CONWAY (Bristol) stated that in Bristol maintenance of gas engines was carried out.

Mr. C. BRICE (Bristol) suggested that, with high-speed gas engines, expensive reduction gear would be needed.

Mr. S. S. LLOYD (Weston) mentioned that the hire-purchase system for engines had been introduced at Weston with good results.

Mr. S. HOLE (Bath) stated that an ordinary motor car engine was water-cooled or air-cooled. How would a small gas engine be cooled?

Mr. FELTHAM (Bath) replied that a pulley reduction gear could be adopted, as with high-speed electrical motors, and that a small fan could be utilized for cooling the gas engine.

A vote of thanks was accorded to Mr. Feltham and Mr. Ashman for their papers.

Road Signs and Traffic Signals.—Arising out of the discussion at the Street Lighting Conference held by the Association of Public Lighting Engineers at Brighton last September, in connection with the above subject, it is proposed to hold a meeting with a demonstration and discussion at the hall of the Electric Lamp Manufacturers' Association, Lighting Service Bureau, 15, Savoy Street, London, W.C. 2, on Tuesday, Feb. 21, at 7.30 p.m. It is thought that this would be a fitting opportunity to have as complete an exhibition and demonstration as possible of the signs, &c., already in use for this purpose. The discussion will be opened with a brief paper by Mr. W. J. Jones, M.Sc.

Pitman's Dictionary of Industrial Administration.—An excellent way to acquire a good insight into the problems and details of industrial management is to subscribe to the fortnightly parts of Pitman's "Dictionary of Industrial Administration," complete in thirty parts, at 1s. 3d. each. This is a thoroughly up-to-date publication, edited by Mr. John Lee, C.B.E., M.A., M.Com.(Sc.), and issued by Sir Isaac Pitman & Sons, Ltd. Its contributors number over a hundred eminent specialists, drawn from every department of industrial activity; and both the student and the industrial owner and employee are thus provided with a comprehensive guide to the essential facts and methods. The first part, just received, indicates the detailed and authoritative treatment given to the several subjects, and contains an interesting introduction by the Editor, together with a detailed "Who's Who of Contributors."

TOWN GAS FOR INDUSTRIAL PURPOSES.

NOTES ON THIS BRANCH OF THE AUSTRALIAN GAS LIGHT COMPANY'S ACTIVITIES.

By J. H. BANKS, of Sydney.

[From a paper before the Australian Gas Institute.]

For many years no distinction was made between ordinary and industrial consumers by the Australian Gas Light Company, and the only rebate granted was 6d. per 1000 c.ft. for gas used in engines. In October, 1922, this was extended to all industrial users, and an officer was set apart solely to handle industrial gas matters.

The gas sales for the December quarter, 1922, were:

Total gas sold	1,335,813,000 c.ft.
Gas used industrially	11,520,000 ,,
P.ct. of total	0·87
Gas used in engines	17,680,000 c.ft.
P.ct. of total	1·32

A sliding-scale rebate for industrial gas was granted in October, 1924, which allowed 10 p.ct. reduction for 50,000 c.ft. per quarter and graduated up to 25 p.ct. reduction for 1¼ million c.ft. per quarter; and, as the direct outcome of this arrangement, it was thought desirable to appoint technical and clerical officers to cope with the growing needs of this section.

For the September quarter, 1924, the gas sales position was:

Total gas sold	1,669,506,000 c.ft.
Gas used industrially	39,595,000 ,,
P.ct. of total	2·37
Gas used in engines	11,176,000 c.ft.
P.ct. of total	0·67

In June, 1927, it was considered advisable to make a further extension in the scale of rebates; and the present rates were adopted:—

Over	50,000	c.ft.	and under	125,000	c.ft.	per qtr.,	10 p.ct. rebate
,,	125,000	,,	,,	250,000	,,	,,	12½ ,,
,,	250,000	,,	,,	500,000	,,	,,	15 ,,
,,	500,000	,,	,,	750,000	,,	,,	17½ ,,
,,	750,000	,,	,,	1,000,000	,,	,,	20 ,,
,,	1,000,000	,,	,,	1,250,000	,,	,,	22½ ,,
,,	1,250,000	,,	,,	2,500,000	,,	,,	25 ,,
,,	2,500,000	,,	,,	5,000,000	,,	,,	27½ ,,
,,	5,000,000	,,	,,	7,500,000	,,	,,	30 ,,
,,	7,500,000	,,	,,	and over	,,	,,	33½ ,,

In August, 1927, the Industrial Gas Section was made a separate Department.

The distribution of rebates for the quarter ended September, 1927, was as follows:

20	p.ct.	of the	industrial	gas	consumed	received	10 p.ct. rebate
18	,,	,,	,,	,,	,,	,,	12½ ,,
17	,,	,,	,,	,,	,,	,,	15 ,,
11	,,	,,	,,	,,	,,	,,	17½ ,,
5	,,	,,	,,	,,	,,	,,	20 ,,
1	,,	,,	,,	,,	,,	,,	22½ ,,
20	,,	,,	,,	,,	,,	,,	25 ,,
4	,,	,,	,,	,,	,,	,,	27½ ,,
4	,,	,,	,,	,,	,,	,,	30 ,,
0	,,	,,	,,	,,	,,	,,	33½ ,,

Average rebate received, 16·8 p.ct.

The latest gas sales return shows:

Quarter ended September, 1927.

Total gas sold	1,832,976,000 c.ft.
Gas used industrially	81,526,000 ,,
P.ct. of total	4·45
Gas used in engines	5,706,000 c.ft.
P.ct. of total	0·31

It will be seen that the quantity of gas used for industrial purposes in Sydney is steadily increasing. Many factors have contributed to this increase; and we propose to pass in review, briefly, some of the most important.

The policy of the Australian Gas Light Company in granting rebates to consumers has been very helpful in securing new business. From the Gas Company's point of view, there is ample justification for it, especially when it is known that the industrial consumer involves less capital outlay and also less overhead and service expense than the ordinary user. Another factor regarding industrial business, and one that is of vital importance to the gas industry, is the tendency of such a load to flatten the peak load periods. The economic advantages of industrial gas business are fairly well illustrated by the following.

During the June quarter, 1927, 219,169 ordinary consumers used 1,557,501,000 c.ft.—an average for each consumer of 7106 c.ft. On the other hand, 695 industrial consumers used 72,291,000 c.ft.—an average of 114,088 c.ft.—which means that each industrial consumer used as much gas as 16 ordinary consumers.

The "quantity" rebate at present in force in Sydney has proved very satisfactory, and has certainly the merit of being simple. Its assessment involves no cost to the company; and once an account is certified, the system leaves no room for argument. Some difficulty is, however, experienced in drawing a line of demarcation between ordinary and industrial consumers.

The proportion of industrial gas used by the various trades for year ended September, 1927, is given below:

	P.Ct.
Bakeries	11
Manufacturers of foodstuffs	22
Glass and ceramics	12
Engineering establishments	24
Newspapers, printing, and publishers	12
Textile and clothing manufacturing	10
Miscellaneous industries	9

This indicates that gas is being used in practically every industry in Sydney.

Dozens of gas-fired steam boilers, in all sizes up to 12 H.P., are now at work in Sydney. With regard to gas-fired travelling ovens for biscuit baking, one firm now have in use six of these ovens, and, being well satisfied with them, propose to erect at least ten more. This will completely eliminate all the ovens now fired by solid fuel at their factory. These ovens use high-pressure gas. Each is 50 ft. long by four pans wide. The biscuits travel through at a rate of approximately 10 ft. per minute. The gas consumption at this factory now exceeds 30 million c.ft. per annum.

THE MICHELL CRANKLESS GAS ENGINE.

Several of these units, direct connected to gas boosters, may now be seen at work in Sydney, and mark a big forward step in the development of prime movers. They occupy little space per horse-power developed, and have practically no vibration or noise when running. A recent test of a 70 H.P. machine in Sydney under working conditions gave a thermal efficiency of 28 p.ct. As this was one of the first machines built, still higher efficiencies are likely to be obtained in later models. As it is known that the thermal efficiency of a large steam power plant of the latest design rarely exceeds 20 p.ct., the above result, obtained on a small outfit, is at least interesting; and later developments and applications of this engine will be carefully watched. At least 30 p.ct. of the heat supplied to internal combustion engines is carried away by the exhaust gases, and the possibility of using the crankless engine (driven either by gas or residual oil) in combination with a waste-heat boiler, should be of particular interest to gas-works and other industries requiring, in addition to power, a certain amount of heat for process work.

Telephone System in a Waterless Gasholder.

Several times during the day a workman at the new waterless gasholder of the Pacific Gas and Electric Company, in Oakland, climbs to the top of the 310-ft. holder, enters the structure, and descends to the top of the piston to take check of the tar used in the tar seal, and to see that other parts are working properly. It is explained in the "Gas Age-Record" that three special telephones have been installed in order to enable this workman to keep in communication with the operator of the compressor station. One telephone is installed at the compressor station operator's desk, one on the roof of the holder, and the third on the top of the piston, which rises and falls within the holder as the volume of gas increases or decreases. Before starting on each trip, the workman notifies the operator of the compressor station; and he also notifies the operator when he reaches the roof, using the telephone installed at that point. He then descends to the top of the piston by means of an electrically operated elevator. The workman telephones the compressor station operator as soon as he reaches the top of the piston, so that the station operator is in constant communication with the man in the holder. By means of a series of pulleys and weights, the telephone cable extending from the piston to the roof automatically has the slack taken out as the piston rises.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Education Scheme—Examinations, 1928.

SIR,—Will you allow me to use your columns to remind all students who wish to sit for this year's examinations in Gas Engineering or Gas Supply as *external* candidates, that their applications must reach me at the latest by Feb. 28?

Also that candidates for the Diploma of the Institution must forward their theses to the undersigned on or before March 28. If earlier, the better.

WALTER HOLE,
Organizing Secretary.

Wharfedale, Barton,
Torquay,
Feb. 8, 1928.

Thermal Calculations.

SIR,—What I feared has happened. The discussion on thermal calculations is no longer dealing with thermal calculations, but is apparently becoming a purely personal one.

Prof. Travers mentions the Indian plant. I have explained the exact position in public on several occasions, and I will repeat it. This plant was delivered by us to an Indian group for a specific purpose on the recommendation of their London advisers. When it came to the running and operating of the plant, we could not convince them that they would have to pay a good salary for a good man, and that unless they appointed a man in whom we had confidence, we could do nothing further in the matter. The result was that there were many works managers appointed by them in quick succession.

Last year they came to their senses; and we sent out our own people, who ran the plant satisfactorily.

The figures I mentioned in my critique of Prof. Travers' papers are facts, and nothing but facts. Anybody genuinely interested knows where to find me; but with reference to Mr. Marshall, if he thinks that I am prepared to broadcast information which will be highly valuable to him—and there may be others who think that I am prepared to do this—he is very much mistaken.

HARALD NIELSEN.

Feb. 10, 1928.

Nuneaton and the Two-Part Charge.

SIR,—In his letter to you of Feb. 6, Mr. Helps again goes off into two of his common errors. First, in his economic balance-sheet, he takes the value of the gas at the selling price, forgetting that the gas is not worth the selling price until a great deal of further expenditure has been entailed.

Secondly, he calculates his profits on the basis of coal tonnage, not recognizing that, if we use one-third of the coal, the gross profits of our business are reduced proportionately. I know he will reply that we should use the same tonnage, and sell three times the quantity of gas; but that remains to be seen.

However, let us get away from argument, and come down to facts: I have some figures for an undertaking which is manufacturing gas by what Mr. Helps would call the "coke producing method." Here are the figures for the month ended Dec. 31, 1927:

Net cost of carbonizing materials. . . .	**0·18d. per therm**
Carbonizing, purification, expenses on coke, supervision, works repairs, &c.	**0·61d. ,,**
Total cost of production into gasholder . .	**0·79d. per therm**

Will Mr. Helps volunteer the corresponding figures for Nuneaton for the gas made by his method?

"ENGINEER."

Feb. 10, 1928.

REGISTER OF PATENTS.

Gas Washers.—No. 283,028.

W. C. HOLMES & CO., LTD., COOPER, C., and HENSHAW, D. M., all of Huddersfield.

No. 10,224; April 13, 1927.

This invention consists broadly in providing the rotary members of gas washers with buckets adapted to secure a substantially continuous delivery of fluid on to the material secured to the rotary members during the time such buckets are travelling through the arcuate path situated above the horizontal median plane of the chamber.

The buckets are perfectly arranged to secure that the quantity of liquid which is discharged at any moment by the same during the rotation of the rotary member with which they are associated shall be proportional to the distance through which the liquid discharged from them travels before finally falling out of the useful contact zone. A plurality of buckets in immediate association or combination one with the other are normally employed for securing the distribution of the liquid. Usually the buckets will be arranged in pairs.

Purifiers.—No. 283,283.

HOLLIS, H. H., of Leeds.

No. 24,997; Oct. 8, 1926.

The object of this invention is to provide a simplified joint and fastener for securing the covers to the tops of the gas purifiers or tanks which are so constructed as to form a water leak-detector; it is also capable of being applied to, or taking the place of, the dry seals now in use.

According to the invention, the purifier has a frame projecting from the top, on or to which is fixed or cast a vertical portion to form a curb and a channel which extends wholly around the top plate. A second frame is fixed so as to form a part of the cover for the purifier; the horizontal portion of the last-named frame having fixed to its undersurface a rubber or other packing for forming a wall opposite to the curb. A number of clamping plates—mounted upon vertical bolts or studs fixed at distances apart on the said top plate—and nuts or cotters for compressing the clamping plates and packing on to the top of the purifier are also provided. The channel on the curb acts as a receiver for a thin layer of liquid for detecting any leakage or escape of gas.

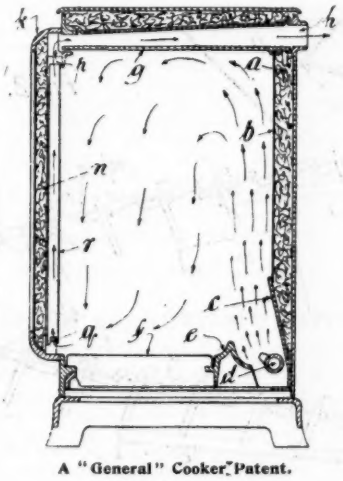
Other features are dealt with in the specification, which is fully illustrated.

Cookers.—No. 283,450.

GENERAL GAS APPLIANCES, LTD., and FRANCIS, W. R., both of Manchester

No. 26,022; Oct. 3, 1927.

This invention has for its object to provide an improved construction of oven to enable a more effective utilization and distribution of heat. It is sought to effect this by providing a flue in, or on, or supplementary to, the door of the oven to form a flue at the front. Preferably the burner is at the back of the oven.



A "General" Cooker Patent.

It will be seen from the sectional side elevation which we reproduce that the back wall of the oven is lagged. The lagging *a* is covered by a plate *b*; and the lower part *c* of such plate is made separate and of a thicker gauge to resist the direct heat of the burner, and is inclined to enable the burner to be placed as far back as possible in the oven. In front of the burner is a detachable plate *e*, positioned so as to direct fresh air from under the oven on to the burner and also to prevent the smothering action of the circulating products in the oven, therefore ensuring perfect combustion of the gas. This plate *e* supports the back end of a bottom plate *f* for the oven. The top *g* of the oven embodies a flue *h* opening at the front face into slots. The oven door *k* is made to fit closely to the front face of the oven at the bottom and sides and at the top above the flue slots already described; and it has a transverse bar which stands out slightly and away from the door and fits closely into the oven and against the roof. The door is lagged with heat resisting lining *n*.

On the inside of the door and at the bottom are formed two lugs *q*. The false back or flue plate for the door consists of a metal sheet *r* the sides of which are bent over to form a channel which is adapted to register with the lugs *q*; the plate being readily detachable and being fitted by placing it behind the transverse bar and raising it as far as possible, when the lower end may be passed over the lugs *q*.

The plate *r* may then be lowered a short distance on to the lugs *q* when it will be secured, the upper end being still strapped behind the transverse bar. The upper edge of the plate co-operates with the transverse bar so as to overlap with same and close access to the flue from the top of the oven.

The false door back may be provided with other openings—say, intermediately—which may be controlled by dampers; and the particular construction of the flue, though preferably formed of easily detachable parts for cleaning purposes, may be varied without departing from the nature of this invention. Further, some other burner arrangement may be adopted, and the construction may be varied without departure from the sense of the invention.

Screens.—No. 282,176.

BURR, J., of Banstead.

No. 23,409; Sept. 22, 1926.

This invention relates to that method of screening materials—particularly such as are more or less fragile, like coke—which consists in causing them to travel along a trough in which there is a longitudinal slot or a succession of longitudinal slots becoming wider in the direction of travel, or along spaced bars having similar qualification, and at the same time causing the material to turn over so that pieces too large to pass through the slot or space are rolled and raised to permit smaller pieces to pass through.

FIG. 1.

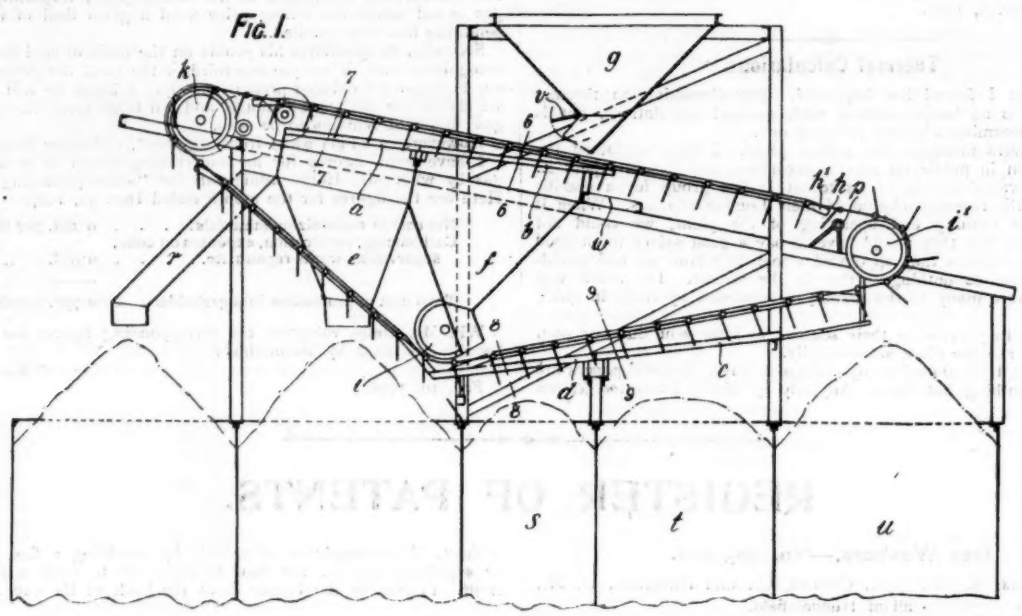
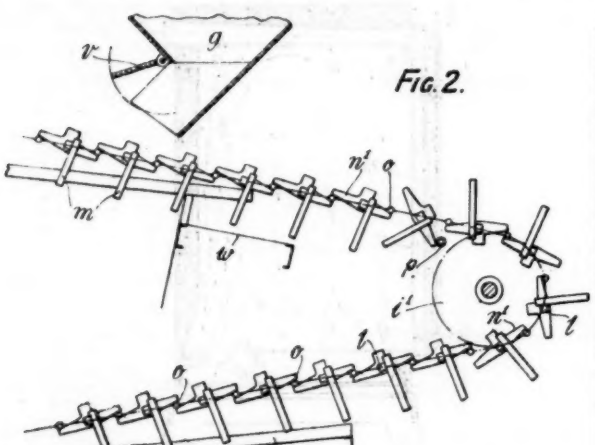


FIG. 2.



Burr's Screening Plant.

The patentee claims that his invention improves the efficiency of this method of screening; and its essence resides in the mode in which this turning movement is obtained. Hitherto the movement has been a motion of the pieces of material relatively to each other caused by checking or retarding devices extending into the layer of material travelling on the screen. By the present invention the pieces of material are caused to travel by a conveying device comprising fingers or the like which has a rising and forward movement, the resultant action of which is to roll the material along the screen.

Fig. 1 shows a diagrammatic elevation of the screening plant; and fig. 2 an elevation of part of the plant drawn to an enlarged scale.

There are shown four sets of bars *a*, *b*, *c*, *d*. The bars of each set are parallel to each other; but bars *a* are spaced apart more widely than bars *b*, the latter more widely than bars *c*, and bars *c* more widely than bars *d*. Bars *a* and *b* are aligned and are supported on the hoppers *e*, *f* respectively at a small angle to the horizontal; bars *b* constituting the lower part of the incline. Bars *c* and *d* are also aligned, and are carried by the general framework at a slight angle to the horizontal; bars *d* being the lower part of the incline.

Endless conveyor chains *h* sliding on tracks h^1 pass over guide rollers *i*, i^1 and a suitably driven chain wheel *k*. These chains carry bars *l* of rectangular cross-section to which are clamped holders for finger bars *m*. The latter are all of the same length and extend into the spaces between the bars *a*, *b*, *c*, and *d*. The tracks h^1 being carried by the framing at an inclination to the horizontal somewhat greater than that of the last-named bars, the fingers *m* extend some distance through the spaces between these bars at the lowest part thereof and gradually rise in the spaces in the course of the travel of the fingers.

It is a feature of the invention that the conveyor is operative in both its lower and its upper run. To achieve this it is necessary that the bars *l* should turn through an angle approaching 360° as they pass into the upper run. For this purpose the ends of the bars *l* are formed as pivots which turn in the links of the chains *h*. At each end each bar *l* carries so as to turn therewith a boss having oppositely extending arms n^1. The chains carry stops *o* which may be enlarged heads of the chain pivots; these stops engaging the arms n^1 when the latter are in the upper or lower run in the manner shown in fig. 2. Owing to the resistance to the passage of the fingers *m* between the bars *a*, *b*, *c*, and *d* (due to the material being screened), the arm n^1, which is forward in the direction of travel, is forced downwards, and the rear arm upwards against its stop *o*, so that the bar *l* cannot turn on its pivots. In travelling over the guide roller i^1 the forward arm n^1 remains against its stop until it passes into the upper run, where a projection strokes a stationary roller *p* and the bar *l* is thus turned on its axis so that the fingers *m* become dependent in the upper run.

The material to be screened is discharged from the hopper *g* on to the bars *b*. The finer material passes between the bars into the hopper *f*, from which it is discharged on to the bars *d*. The coarser material on the bars *b* is carried up with more or less lifting and rolling motion on to the bars *a* where all but the largest material passes into the hopper *e*. The large material is dumped from the bars *a* into the chute *r*. A similar screening occurs on bars *d* and *c*, the finest of the three grades collecting in bin *s*, the medium in bin *t*, and the coarsest in bin *u*.

It is found that the action of the fingers *m* passing between the bars *b* in assisting passage of the finer material through the spaces between the bars *b* is aided by the action of the bars *l* as they are dragged through the heap of material lying at the angle of repose between the discharge mouth of the hopper *g* and the bars *b*. This action of the bars *l* is in its turn aided by the dimensions of the heap, which should be greater for coarse material than for finer material. According to the invention the dimensions of the heap are made variable by providing the hopper with a hinged door *v* forming one side of the discharge mouth. By adjusting the position of the door the heap can be made larger or smaller. The table *w* serves to support a part of the heap.

The number of sets of bars or troughs used may be smaller or larger than that shown. It is sometimes desirable to hook or notch the effective edges of the fingers.

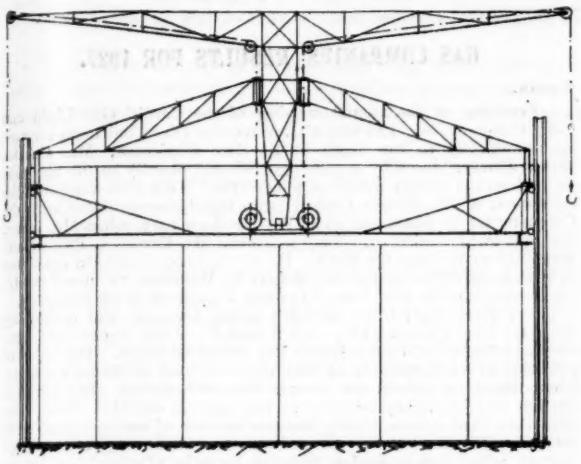
Dry Gasholder Construction.—No. 283,809.

MARKS, E. C. R., of Lincoln's Inn Fields, W.C. 2 (a communication from the M.A.N. Company, of Nuremberg).

No. 22,893; Aug. 31, 1927.

In building waterless gasholders the disc has been employed as an erecting stage, being continually raised during the building;

and thus the employment of special scaffolding and platforms is rendered unnecessary.



A "M.A.N." Holder Building Patent.

The present invention relates to an auxiliary arrangement, whereby a slewing crane is associated with the disc. The jig is so dimensioned that the periphery of the entire holder can be served.

The crane may advantageously be provided with two equal jibs, so that work can proceed on two sides of the holder.

We reproduce a drawing illustrating the invention.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Feb. 8.]

Nos. 2845—3585.

BRITISH MANNESMANN TUBE COMPANY, LTD.—"Joints for pipes." No. 3100.

CORT & SON, LTD., R.—"Rotary screens." No. 3478.

DEMPSTER & SONS, LTD., R.—"Apparatus for handling coke." No. 3392.

DICKENS, C.—"Incandescent gas burners." No. 3486.

DOCKING, A.—"Supply of gas burners." No. 3543.

EKELUND, S. C. G.—"Gas producers." No. 2932.

FORSTER, J. D.—"Gas controllers." No. 3455.

FRANKFURTER GASGES.—"Utilizing waste heat in gas-producing plant." No. 3080.

FRANKFURTER GASGES.—"Apparatus for utilizing heat evolved in gas generators." No. 3081.

GOULD, F.—See Dickens, C. No. 3486.

HAILWOOD, E. A.—"Holders for lamp shades." No. 3262.

HANDLEY, W. H.—See Dempster & Sons, Ltd., R. No. 3392.

KILBURN, B. E. D. (SULZER FRERES SOC. ANON.).—"Installations for dry cooling coke." No. 3006.

LAING, B.—"Distillation of carbonaceous materials." Nos. 3421, 3422.

METROPOLITAN GAS METERS, LTD.—"Gas controllers." No. 3455.

NIELSEN, H.—See Laing, B. Nos. 3421, 3422.

OAKLEY, P.—"Gas cookers." Nos. 2973, 2974.

REICHARD, F.—See Frankfurter Gasges. No. 3080.

RITCHIE, HART, & Co., LTD.—See Docking, A. No. 3543.

SCHUMACHER, E.—See Frankfurter Gasges. No. 3081.

SMITH, E. S.—See British Mannesmann Tube Company, Ltd. No. 3100.

SOC. GENERALE DE FOURS A COKE SYSTEMES LECOCQ.—"Extinction of coke." No. 3479.

STOVES, LTD.—See Oakley, P. Nos. 2973, 2974.

SULZER FRERES SOC. ANON.—See Kilburn, B. E. D. No. 3006.

TILLMETZ, F. P.—See Frankfurter Gasges. No. 3081.

LEGAL INTELLIGENCE.

DUNDALK GAS PREMISES VALUATION DISPUTE.

Commissioners Fail.

Judgment was delivered on Feb. 3 in the High Court, Dublin, dismissing the appeal by the Commissioners of Valuation from an Order of Judge Doyle, who decided in favour of the Dundalk Gas Company, the present respondents, in their appeal against a valuation of £565 assessed on their gas-works, Manager's residence, and foreman's house, offices, and coal store, and against a valuation of £400 assessed on their easement, of laying and using gas mains within the streets and roads of the Urban District of Dundalk, on the ground that the valuations were excessive and did not represent the annual value of the premises.

The Commissioners appealed on law from the Order of Judge Doyle on the ground that he misdirected himself, and was wrong in law in holding that section 7 of the Annual Revision of Rateable Property (Ireland) Amendment Act, 1860, applied to a gas undertaking.

Mr. Justice SULLIVAN, in his judgment, quoted Lord Halsbury in the Mersey Docks case, which was decided by the House of Lords in 1901, the effect of which was that the question which the valuators on behalf of the parish in England (which was represented by the Valuation Office in Ireland) had to decide was what was the net annual value of the premises, taking one year with another, if let in their actual state to a tenant paying the rates and taxes and other outgoings. This was really a question of fact; and although a simple one as regards the actual question, the working-out of the reply to it might, and frequently did, cause great difficulties. Nevertheless it was a question of fact, and not one of law; though it had sometimes been treated as a question of law. The reason for its being so treated was because the assessors had in some cases taken into consideration some other item which in law they were not entitled to take.

His Lordship expressed the opinion that the reasoning of Lord Halsbury in the case applied very clearly to the present case. In his opinion, therefore, this appeal should be dismissed.

Mr. Justice O'BYRNE concurred, and the appeal was accordingly dismissed with costs.

Mr. M'CANN, K.C., who with Mr. GEORGE O'CONNOR (instructed by the Treasury Solicitor) appeared for the appellants, said that their Lordships' judgment would have to be considered by the Commissioners; and he asked for a certificate to enable them to appeal in the event of their deciding to do so.

Mr. Justice SULLIVAN said the Court would grant the certificate.

THE "TAR POOL."

In the Court of Appeal, on Monday, Feb. 6, Lords Justices Scrutton and Atkins and Mr. Justice Astbury dealt with the case of Crow, Catchpole, & Co., Ltd., *v.* Burt, Boulton, & Haywood, Ltd., in an appeal against an order of Mr. Justice Swift.

The litigation concerned the "Tar Pool;" and it appeared that plaintiffs sought an injunction to restrain the defendants from committing an alleged breach of an agreement with them. Their allegation was that defendants had entered into a contract with another concern—the South Eastern and Kent Company, Ltd.—with regard to consignments of crude tar; and the plaintiffs' case was that the area covered by the latter Company came within the area of the "Tar Pool." Defendants had taken out a summons to stay the proceedings, because of an arbitration clause; and Mr. Justice Swift, in chambers, made an order in favour of the defendants.

Plaintiffs appealed; and Mr. FORTUNE, on their behalf, stated that at present great difficulty was experienced in getting supplies of crude tar, and the plaintiffs had suffered damage through non-delivery because of the defendants' action.

Lord Justice SCRUTTON said they had to adjudicate merely on this appeal, and were not trying the action. It seemed sound to contend that the action should not be stayed in the circumstances; for apparently one of the parties in the litigation, it was contended, was not bound by an arbitration clause. Therefore he thought the matter should be fought out in open Court; and the appeal would be allowed.

ANTRIM GAS COMPANY'S CAPITAL.

Mr. Justice Wilson lately heard a petition in the Ulster Chancery Division from the Antrim Gas Company, Ltd., to reduce the capital of the Company, which was registered in 1856. Counsel said the original capital was £1200, divided into £1 shares; but later this was increased to £1800, at which it now stood. During the last few years several of the largest consumers of gas in the town and neighbourhood of Antrim had begun to manufacture electric light with private plants; and attempts had been made by the Town Commissioners and others to introduce a system of electric lighting. If such were brought about, the Company would almost certainly lose the lighting of the streets of the town, and also the supply of gas to many of the best customers, with the result that it would be impossible to carry on the manufacture of gas except at a loss. The Company was quite solvent. In 1920 a dividend of 5 p.ct. was paid. Nothing was distributed in the five succeeding years; but in 1926 there was a dividend of 5 p.ct., and last year one of 2½ p.ct. In September last shares were sold at 6s. 8d. and 8s. each, and in March and April at 10s. each. The Directors believed that by producing both gas and electricity, the Company could carry on business at a profit; and they intended to advise the shareholders to commence the generation of electricity for sale. They would increase the capital, and create and issue new shares, to raise the amount necessary for the purpose of commencing this business. A sum of £3500 would be necessary. If the capital remained at its present figure of £1800, it would not be practicable to obtain any additional capital with which to establish the production of electricity; but the Directors believed that if the capital were reduced to £900, and if the Company were empowered to establish and carry on the production of electricity, the necessary capital would be forthcoming. His Lordship granted the petition.

MISCELLANEOUS NEWS.

INQUIRY AT HEREFORD.

Question of River Pollution.

The question of the River Wye being polluted by effluent was discussed at an inquiry conducted at Hereford on Feb. 1, by Mr. F. Gregson Williams, an Inspector of the Ministry of Health, into an application of the Hereford City Council to borrow £38,287 for the purpose of installing new plant at the gas-works.

In reply to the Inspector, the City Surveyor (Mr. W. McNeil Shimmin) explained that there was a possibility that the effluent in the form of spent liquor from the new plant would be injurious to fish life in the river. The Wye was a very valuable fishing river, and the fishing rights were estimated at about £75,000. He had also asked the Sewers Committee carefully to consider the question as to whether the spent liquor would interfere with the present system of biological treatment at the sewage disposal works. By their instructions he had secured expert opinion on this matter from Messrs. Bostock, Hill, & Rigby, public analysts, of Birmingham, who stated that if the spent liquor was, as suggested, limited to 5000 gallons per day, and the dry flow was 1¼ million per day, there would be no practical difficulty in treating the mixture by biological methods. A very important point to observe was that the discharge of the spent liquor into the sewers should be at a uniform rate. No sudden flush of the spent liquor should be permitted in any circumstances.

On being asked whether he thought that there would be no danger to fish life, to the sewers, or to the works, Mr. Shimmin replied: "I must be guided to a great extent by the report of the analysts, and, further, I am assured by the Gas Engineer that we have nothing to fear."

It was stated during the inquiry that with the erection of the new plant an annual saving of between £5000 and £6000 would be effected, and that there would consequently be an appreciable decrease in the price of gas.

PORTSMOUTH GAS COMPANY'S INSURANCE SCHEME.

Following the introduction of a staff pension scheme four years ago, the Portsmouth Gas Company are now making provision for the life assurance of those of their employees and pensioners who are married and have dependants. Explaining the scheme at a special meeting of the Company's male employees, the Chairman, Mr. T. H. F. LAPTHORN, J.P., stated that it would apply to male employees or pensioners who on April 1 next, when it would come into operation, were not less than 22 years of age, with not less than five years' continuous service, and with one or more dependants. Pensioners over 75 would not come into the scheme when it was started, but a pensioner once in the scheme would remain in it if he lived to be 100. On the other hand, employees or pensioners ceasing to have one or more dependants would automatically go out of benefit, also employees who left the Company's service; but an employee would still be deemed to be in that service if absent from active and continuous work by sickness or ill-health for a period not exceeding nine months.

Dealing with the method by which the scheme would be worked, Mr. Lapthorn stated that the Company would take out a group life policy covering all those in the scheme, under which the Company would receive a fixed sum from the insurance company on the death of any employee while in the Company's service, and on the total disablement of an employee before reaching 65 or going on pension, and also on the death of any pensioner while drawing a pension. This money would be available in the hands of the Company for the dependants of the man so dying or becoming totally disabled. Shortly, a dependant under the scheme meant a wife, or a child under 15. If the pensioner or employee left one dependant—*i.e.*, a wife, or a child under 15—the insurance would be one year's salary or wage; if two dependants, an additional one-tenth of one year's salary or wage; if three dependants, another additional one-tenth; and a similar addition of one-tenth for each additional dependant up to six in all. For a man leaving six dependants or more, the amount insured would be 150 p.ct. of one year's salary or wage, which would be the maximum.

Mr. Lapthorn added that it was the common experience when a lump sum of money was received by a person who had not been used to handling a large sum it was often frittered away or wasted; and the Directors anticipated that in the great majority of cases the money would be given out by weekly payments to supplement the widow's income. But they felt that, in the interests of the dependants, it was best for the Directors to have full discretion in the matter. In deciding how best to use the money, their only anxiety would be to find the way which would do the wives and kiddies left behind the most good. The scheme was intended to provide for those cases of death or total disablement for which no provision for compensation already existed, and it was not intended to compensate a man's dependants twice over. The Company would bear the whole cost of the scheme, and it was not necessary for any employee to be medically examined before coming into it.

The scheme has been received by the employees with considerable enthusiasm.

A pleasant evening was spent by the members of the Leamington Gas-Works Cricket Club, and their friends, on Feb. 2, at a whist drive and social evening organized by the Committee of the Club, and held at the Leamington Priors Gas Company's showrooms.

GAS COMPANIES' RESULTS FOR 1927.

Cardiff.

Presiding at the annual meeting of the Cardiff Gas Light and Coke Company, Mr. LAWRENCE G. WILLIAMS (the Chairman) referred sympathetically to the death of the late Chairman, Mr. Charles Edwin Dovey, who only a year ago referred proudly to the fact that he had served twenty years as a Director. They also regretted the retirement of Mr. Edwin Corbett, who had been connected with the Company for 39 years, and as a Director since 1915, when Mr. Dovey was appointed Chairman. They welcomed Mr. Ernest A. Prosser and Mr. William Wade to the Board. He (the speaker) had been appointed to succeed Mr. Dovey; and Mr. Robert H. Williams, the new Deputy-Chairman, was the grandson of the first Chairman of the Company.

The capital expenditure included mains for new and developing districts, like Canton, Ely, and Llandaff. They hoped this year similarly to extend to the Roath and Splott districts. The sales of gas showed a reduction as against 1926, the year of the coal dispute, when the use of gas in the autumn was phenomenal. The 1927 reduction was practically confined to two autumn months. Year after year there had been a steady increase in face of the strongest competition. The increase in gas sales in 1927 over 1925 was 226,608 therms, which was equivalent to 6,644,333 units of electricity. Many electrical undertakings would be gratified above measure to show such an increased output. Industrial depression had directly affected consumption, and a return of prosperous times would mean a greater increase. During the year they had added 1995 consumers, while the output of appliances had been: Cookers, 3578; gas fires, 2365; washboilers, 527 (apart from 800 supplied by the Corporation and other house builders); gas radiators, 197; geysers and circulators, 88; gas irons, 50; and inverted burners, 19,142.

Prepayment meter consumers expressed a preference for gas lighting, which was appreciated also as a means of warmth. Poor people appreciated the fact that a gas mantle, renewable for a few pence, could be made to last a year or more, while electric bulbs had a comparatively short life, and renewal involved a high cost.

While further reduction in charges was in their minds, the markets for residual products were a source of some anxiety. The 1927 returns were 57·2 p.ct. of the cost of coal—5·48 p.ct. more than in 1925, and 10·12 p.ct. higher than in 1926. Increased revenue from the sale of tar compensated for a corresponding reduction in revenue from coke, which had followed the price of coal. Markets for all kinds of fuel were difficult in industrial depression, and must have a close bearing on questions of reduction in price of gas. The proportion of coke sold for domestic use continued to increase.

The co-partnership scheme continued to give mutual satisfaction, and £500 had been transferred from the divisible profits to the reserve fund. The bonus of co-partners had been increased to that extent.

It was hoped that a Bill would be before Parliament next session which would substitute the antiquated provisions of the Gas-Works Clauses Acts of 1847 and 1871, and give the industry that freedom and control of its affairs which were necessary for its future development and expansion.

Generally, the position was full of promise, while the Company's position indicated strength and stability. Gas stock was still as safe and as satisfactory as at any time in the history of the industry. No company had a better, more loyal, or more competent set of officials and men working for them, and that they were contented was the best guarantee for the prosperity of the Company.

The report and annual statement were unanimously adopted, and dividends at the rate of 6 p.ct. on the ordinary stock and 4½ p.ct. on the preference stock were declared.

Councillor G. FRED EVANS, moving thanks to the Directors, said it was pleasing to hear of increasing consumers and of the big demand for appliances. The shareholders had the utmost confidence in the Directors and the staffs.

Mr. L. H. ALLEN PRATT, seconding, said the Cardiff Gas Company was very efficiently managed and controlled.

The general staff were also thanked; Mr. H. D. MADDEN (Engineer and Manager) and Mr. R. J. AUCKLAND (Secretary) responding.

South Suburban.

The Directors' report for the year, which is to be presented at the meeting on Feb. 17, states that two reductions in the price of gas were made during the year, and another operates from the end of the Christmas quarter, these amounting to 2¾d. per therm. The present price of 0⅝d. per therm is 1⅜d. below the price current at the beginning of the coal strike in 1926. As compared with those of the previous year, the sales of gas show an increase of 4·83 p.ct. The number of consumers has increased by 5061, while the demand for cookers, fires, and other gas appliances has been well maintained. The accounts show that, after providing for debenture and other interest charges, and payment for the first half of the year of a statutory dividend at the rate of 6¾ p.ct. per annum, less income-tax, and a contribution to the special purposes fund, there remains a balance of £65,074, out of which the Directors recommend payment for the second half-year of a dividend at the rate of 6¾ p.ct. per annum, less income-tax, leaving the sum of £24,651 to be carried forward to the next account. A fresh issue of stock will be made in the near future to meet the capital requirements of the Company.

Whitworth Vale.

The revenue account showed a profit of £809, which, added to £165 brought forward, and £3 interest received, and reduced by loan interest £103, left a disposable balance of £874, out of which the Directors declared dividends of 7 p.ct. per annum, less income-tax, on the original shares, and of 5 p.ct. per annum, less tax on the "B" shares.

STATEMENT BY THE BOARD OF RADIATION, LTD.

Accompanying the report of Radiation, Limited, for the year 1927 is the following statement to the shareholders dealing with matters to which reference was made in the editorial columns of the "JOURNAL" on the 1st inst.

The Directors are pleased to meet what they believe will be the wish of shareholders by placing before them the accounts and convening the annual general meeting about five weeks in advance of the usual time.

Radiation Limited was incorporated in 1919. The Company first acquired in 1919 all the issued share capital of

(*a*) John Wright & Eagle Range, Ltd.
(*b*) The Richmond Gas Stove & Meter Co., Ltd.
(*c*) The Davis Gas Stove Company, Ltd.

In 1920 the Company also acquired all the issued share capital of

(*d*) Wilsons & Mathiesons, Ltd.
(*e*) Fletcher, Russell, & Co., Ltd.

These constituent Companies and their subsidiary Companies number twelve in all, and comprise businesses of varying character carried on in seventeen works, all of which are now owned and controlled by Radiation Limited.

When the various Companies were taken over it was a condition of the amalgamation to appoint as Directors of Radiation Limited, nineteen of the Directors of the various Companies, twelve of whom were Managing Directors.

To ensure the continuity of management of these undertakings, it was essential to secure the services of these Managing Directors for a definite term. Service agreements were therefore entered into with all the Managing Directors, binding them for a period of ten years from Jan. 1, 1920. These service agreements were strictly consistent with the provisions of the Articles of Association.

The remuneration payable under these agreements for whole-time service consists of:

A total fixed salary to each Managing Director (other than the Chairman), including Directors' fees in Radiation and its constituent and subsidiary Companies, averaging £1536 per annum.

A commission which has averaged less than 10 p.ct. of the profits, and is divisible between ten Managing Directors. The rate of commission is based in substance on what the Managing Directors of the combining Companies were receiving on the profits of their respective Companies prior to the amalgamation. (The Chairman does not receive any commission.)

A bonus which has averaged less than 9 p.ct. of the profits, and is divisible between eight Managing Directors, including the Chairman; this bonus being payable only in the event of the profits exceeding the total profits of the combining Companies at the date of amalgamation (known as the "datum figure").

Should the total profits of the combined concerns fall below the pre-amalgamation profits, the commission payable to each Managing Director would be correspondingly less than he received before the amalgamation, and no bonus at all would be payable.

The agreement which existed between the Chairman and his constituent Company was cancelled by that Company on terms by which he received from them a payment of £20,000 and the right to purchase at par that amount of shares in the constituent Company, which right he exercised. As the result of this cancellation, the Chairman receives no commission on the profits of Radiation Limited, to which he would otherwise have been entitled, but continues to receive his former salary of £5000 per annum as a Managing Director, and a total of £1162 in Directors' fees (payable under the Articles of Association) as Chairman of Radiation Limited and of certain constituent Companies. Apart from this, the Chairman's remuneration is entirely dependent upon his participation in the bonus payable to Managing Directors on profits in excess of the datum figure explained above.

The amalgamation has proved to be far more successful than was anticipated. This has been generously attributed both by the industry and its Press to the inventive skill (based on extensive research work) and the energy and specialized knowledge and experience of your Managing Directors, who have spent their business lives in the industry, and who devote their whole time to the Company's service. They are responsible for the works, technical, financial, and sales management of the twelve constituent and subsidiary Companies, with their seventeen works and organization. This management, while reducing production costs and selling prices, has brought about the evolution of new appliances of greatly improved type and efficiency, the striking success of which, both at home and abroad, has resulted in the enormous expansion of the business and largely increased profits to the Company, as will be realized from the figures given later in this Circular.

The personal expenses charged by each Director to the Company average less than £160 per annum, and do not, in fact, cover the total personal expenses incurred by the Directors in carrying out their duties.

In 1920 the Board realized the necessity that the Company's headquarters should be in London, and that the Chairman should be established there. Accordingly, at the Board's specific request, the Chairman, who had lived in the Birmingham district all his life, removed to London at considerable domestic inconvenience and financial sacrifice; the allowance made by the Board being considerably less than the expenditure the Chairman actually incurred in complying with the Board's requirements. For nearly a year before Radiation House was ready for occupation by the Company, he used his private residence near London as the Company's headquarters, with staff on the premises; all his work on the Company's business being conducted from there. The establishment of the Company in London proved to be an exceedingly wise move, and has contributed considerably to the efficient working of the Company and its combined concerns.

Comparing the profits prior to and since the amalgamation it appears:

(*a*) That the pre-amalgamation profits (known as the "datum figure") of the constituent Companies, subject only to income-tax and commission on profits, amounted to	£221,718
(*b*) The average annual profits since the amalgamation of the Companies and businesses acquired by Radiation Limited on the same basis amount to	£516,740

which have been appropriated as to 81 p.ct. to the shareholders as follows:

56½ p.ct.	has been paid in gross dividends and bonus to shareholders.
8½ ,,	utilized in payment of income-tax on the balance of profits as computed for income-tax purposes.
16 ,,	is in hand as undistributed profits in Radiation Limited and its constituent Companies.
81 p.ct	
10 p.ct.	has been divided between ten Managing Directors in respect of commission as explained above.
9 ,,	has been divided between eight Managing Directors in respect of bonus as explained above.
100 p.ct.	

The total commission divisible among the ten Managing Directors has averaged £50,732 per annum, and the total bonus divisible among the eight Managing Directors has averaged £45,681 per annum.

The voluntary reduction which the Managing Directors have made dating from Jan. 1, 1927, is equivalent to 42 p.ct. of the bonus on profits which would have been otherwise payable for the year 1927, and 52½ p.ct. for the years 1928 and 1929, the remaining terms of their agreements.

The total gross dividends and bonus declared by Radiation Limited on its preference and ordinary shares since its incorporation (including the proposed dividend to Dec. 31, 1927) amounts to	£2,622,679
The ordinary shareholders' proportion of this in dividend is	£1,344,058
and in bonus is (gross, £707,054) . . . . . net*	565,643
*NOTE.—It will be observed that in the above figure no account is taken of the income-tax paid on the £565,643, this tax amounting to £141,411 (making the gross figure £707,054).	
making a total of	£1,909,701
distributed on the original ordinary share capital of only	£1,696,929
Taking the original issued ordinary share capital of £1,696,929 as above, and adding the bonus shares, the present issued ordinary capital is £2,262,559; and the market value of this at the price ruling for a considerable period of 32s. 6d. per share is . . .	£3,676,658

When Radiation Limited acquired the shares in the various combining Companies, on an average two-and-a-half shares were issued for each share exchanged. The whole of the reserves of the combining Companies were capitalized. No reserves, therefore, being left in hand, the building-up of reserves became imperative. This has been done, as will be seen from the accompanying accounts.

After deducting the £565,643 capitalized in March last, these reserves now amount to £741,438 6s. 3d. (*i.e.*, the total of the items of £122,727 17s. and £618,710 9s. 3d. shown in the accounts), and are liquid, being represented by gilt-edged securities. The Directors consider that it needs no recommendation from them to convince the shareholders of the wisdom of this policy and the absolute necessity of adhering to it for the purpose of strengthening the Company against all contingencies, and of providing for the maintenance of dividends for the shareholders should the necessity arise, by reason of any serious falling off of profits or any other cause.

In view of the considerable business to be transacted at the annual meeting it has become necessary to defer any question of alteration of the Company's Articles of Association for later consideration.

The Directors have issued this explanatory statement, as many shareholders may not be able to attend the annual general meeting.

The Board believe that shareholders in general will appreciate the exceptional prosperity which the Company has attained under its present management, and the widespread recognition of its great stability, prestige in the industry, and financial strength. In submitting the foregoing facts for the information and guidance of shareholders the Directors would emphasize the importance of all shareholders giving their support by returning the proxy form duly signed at their earliest convenience.

RADIATION LIMITED
(T. N. JENNINGS, Secretary).

Feb. 7, 1928.

DIRECTORS' REPORT FOR THE YEAR ENDED DEC. 31.

After bringing in £120,882 2s. 5d. brought forward from 1926, the balance of the revenue account is £401,180 7s. After deducting the

interim dividends (£81,662 19s. 6d.) paid in October last, there remains at disposal the sum of £318,517 7s. 6d., which the Directors recommend be appropriated as follows:

To pay a final dividend of 3 p.ct. to Dec. 31, 1927, on the preference shares, less income-tax . .	£26,100	12 0
To pay a final dividend of £9 7s. 6d. p.ct. to Dec. 31, 1927, on the ordinary shares, less income-tax, making a total gross dividend of 12½ p.ct. for the year	£169,688	18 6
NOTE.—The interim dividend of 2½ p.ct. free of income-tax paid in October, 1927, on the ordinary shares, was equivalent to a gross dividend of £3 2s. 6d. p.ct.)		
To carry forward to next year	£122,727	17 0
	£318,517	7 6

GAS EXHIBITION AT ILKLEY.

An exhibition of domestic gas appliances was opened on Feb. 6, at the Winter Garden, Ilkley. The exhibition was promoted by the Ilkley Council's Gas Department, and there was an attractive display of exhibits. Mr. G. MOTT, Chairman of the Ilkley Gas Committee, presided.

Mr. T. H. FIRTH (Chairman of the Ilkley Urban District Council) remarked that gas had progressed remarkably, not only by reason of its intrinsic worth as a public service and by reason of the high efficiency of its appliances, but also by the wide facilities for advertising now provided. Financial backing for new ideas and inventions was much more easily secured to-day than formerly, because the backers knew that successful advertising would enable them to sell the new article. As a result, those who equipped their homes with gas appliances ten years ago would find in an exhibition to-day many more up-to-date appliances which could be used to their own advantage. He was sure that in the future the extended use of gas fires would have a great influence in eliminating the smoke evil.

Moving a vote of thanks to the opener, the Chairman, and the Ilkley Gas Engineer (Mr. W. Everitt), Mr. W. DOBSON remarked that since acquiring the gas-works, at a cost of £56,000, the Ilkley Council had not only paid interest and sinking fund charges to such extent that in five years the original cost would be wiped out, but they had paid many thousands of pounds in relief of rates.

THREE ILLUSIONS CONCERNING GAS.

Mr. W. M. MASON, the Manager of the British Commercial Gas Association, referred to three illusions still held, although by a steadily diminishing minority, regarding gas and its service in the modern home. The first illusion—that gas was old-fashioned—would be dissipated if it was remembered that the finest London flats, hotels, and boarding-houses were equipped with modern gas apparatus. An examination of the beautiful examples of modern domestic science on view would confirm his statement. The second illusion—that gas was unhealthy—was most effectively countered by the fact that medical men everywhere recommended and used gas; while the health and comfort of countless numbers of workers depended on it for quickly prepared meals at early and late hours. The part gas played in diminishing the smoke nuisance was also a substantial contribution to public health. The third illusion—that gas service was costly—would be found in practice also to be a misconception if all the household budget was taken into account, and a proper assessment put on the work and worry of the housewife.

A CENTURY OF SERVICE.

Leeds Rotary Address.

Mr. W. M. Mason, the Manager of the British Commercial Gas Association, in addressing the Leeds Rotary Club last week, referred to some of the wonders of modern civilization, particularly as represented by public utilities. A real mission in life was, he said, the endeavour to rescue the wonderful from the commonplace. Most of us took as an ordinary matter of course the public services with their network organizations all built up for safety, comfort, convenience, and time and labour saving; services which were seldom fully appreciated until some hitch or temporary breakdown helped to open our eyes to these ordinary, but really wonderful, organizations all instituted for the public welfare.

The supply of town gas was surely one of the greatest, although to the unthinking one of the most commonplace, of these modern marvels. In a great city like Leeds, for instance, over 1000 miles of mains served in one year 90 p.ct. of the citizens—including the majority of working-class folk who depended on gas for hot meals at both ends of a long day—with the potential energy of practically a quarter of a million tons of coal. This was surely a marvellous sample of modern magic which needed to be remembered and appreciated. It had been well said that the gas industry provided "the service that never failed."

Mr. Mason enumerated a number of points from Board of Trade and other sources, and alluded specifically to the important part gas played as the greatest practical co-partner in public health. He referred to the need for a public conscience being roused as regards air pollution by smoke, and appealed to leading public men, as represented by such an organization as the Leeds Rotary Club, to use all the weight of their influence to combat one of the greatest blots on modern civilization.

Mr. Mason, of course, illustrated his address with Scotch tales, which added a touch of relish fully appreciated by the Yorkshiremen; and he was very cordially thanked at the close.

CALORIFIC POWER AT A GLANCE.

Alexander Wright
& CO., LTD.,
WESTMINSTER, S.W.1.
SOLE LICENSEES.

"GAS CALENDAR" AND PORTSMOUTH FIGURES.

In the "JOURNAL" for Jan. 4, Mr. George Helps, in a reference to our "Gas Calendar for 1928," remarked:

> There is one matter I would like to call attention to on p. 155, referring to the comparison of horizontals and verticals at Portsmouth. . . . "The net total cost per gas therm (including net for coal, labour, maintenance, and capital charges) as 1·69d., &c." This statement is surely not complete? It would be most helpful to have all the details as to how this figure is arrived at. I have referred to the paper by Mr. Carmichael, but this does not help me.

We think that if Mr. Helps refers to Table III., "Final Comparative Costs," as given on p. 858 of the "JOURNAL" for June 22 last, he will obtain the information he requires. We might also refer to the opening sentence of Mr. T. Carmichael's paper, which reads: "The author proposes to limit his remarks to the carbonizing plant and methods employed by the Portsmouth Gas Company, giving results and working costs which may be strictly comparative among themselves, and at the same time giving sufficient detail as to labour employed, rates of pay, &c., to make these figures as useful as possible when compared with those obtaining at other works." This makes it perfectly clear that the results and costs refer only to plant at disposal at Portsmouth. The figures quoted in the "Calendar" by Dr. Davidson are quite correct; the total net cost per therm being 1·69d. for horizontals, and 1·67d. for continuous verticals. Perhaps, however, it would have been better to have added that the figures appertained only to Portsmouth, and were obtained when carbonizing Durham unscreened gas coal.—ED. "G.J."

FRIMLEY COUNCIL AND PRICE OF GAS.

Petition against Yorktown and Blackwater Gas Company's Bill.

At the monthly meeting of the Frimley Urban Council on Feb. 7, a report was submitted from the Finance and General Purposes Committee relating to the Yorktown and Blackwater Gas and Electricity Bill.

The CHAIRMAN (Capt. T. Loman) intimated that he wished the Council to consider the reports in committee.

The Committee reported that they had received a letter calling the attention of the Council to the fact that, whereas the price of gas in April, 1924, was 1s. 1·55d per therm, it was now 1s. 3d., or an increase of 7½d. per 1000 c.ft. Further, not only was the price higher, but the lower rate for kitchen gas was discontinued last year, thus considerably enhancing the real increase. The letter suggested that the price of coal was appreciably lower than in 1924, and requested the Council to give the matter their consideration.

The Committee instructed the Clerk to write to the Board of Trade requesting them, on their consideration of the Bill, to give careful consideration to the question of the standard price fixed in 1921—viz., 1s. 6d. per therm; and it was decided to ask the Urban District Councils' Association to advise the Council upon various provisions in the Bill.

The Council have since considered the Yorktown and Blackwater Gas and Electricity Bill, and have decided to lodge a petition against it, and also to apply to the Board of Trade for a reduction of the standard price of the Company.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Feb.* 13.

There have been violent fluctuations in the price of pitch spoken of during the last fortnight; but these can be traced mostly to buyers on the continent. Very little business has been passing. Sellers have not followed the suggested reductions, and there is now a stronger feeling establishing itself. The price is quite nominal, with buyers suggesting 55s. to 60s. and sellers 70s. to 75s. per ton.

Creosote continues steady at about 8¾d. per gallon.

Tar spirits are unchanged as follows: Pure benzole, 1s. 5d. to 1s. 6d. per gallon; pure toluole, about 1s. 10d. per gallon; 95/160 solvent naphtha, 1s. 3d. per gallon; pyridine, about 6s. per gallon.

Tar Products in the Provinces.

Feb. 13.

The tar products markets are generally quiet, with the exception of tar acids, which are still in good demand.

The average prices of gas-works products during the week were: Gas-works tar, 46s. to 51s. Pitch—East Coast, 57s. 6d. to 62s. 6d. f.o.b. West Coast—Manchester, 55s. to 57s. 6d.; Liverpool, 57s. 6d. to 62s. 6d.; Clyde, 60s. to 62s. 6d. Benzole, 90 p.ct., North, 11½d. to 1s. 0½d.; crude, 65 p.ct. at 120° C., 9d. to 9½d., naked at makers' works; 50/90 p.ct., naked, North, 1s. 2d. to 1s. 3d. Toluole, naked, North, 1s. 3d. to 1s. 4d. nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 8¾d. to 9¼d. Heavy naphtha, North, 8¾d. to 9¼d. Creosote, in bulk, North, liquid, 7¾d. to 7⅞d.; salty, 7⅝d. to 7¾d.; Scotland, 7¼d. to 7⅝d. Heavy oils, in bulk, North, 8¼d. to 9¼d. Carbolic acid, 60 p.ct., 2s. 3d. to 2s. 4d. prompt. Naphthalene, £13 to £15; salts, £5 to £5 10s., bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

CONTRACTS OPEN.

Retorts.

The Skipton Urban District Council Gas Department invite tenders for the reconstruction of retorts. [See advert. on p. 411.]

COAL TRADE REPORTS.

From Our Own Correspondents.

NORTH-EAST COAST.

The market has eased off during the past week, and has a quieter appearance than for some time. This may be due to some extent to the wages arbitration awards which were both published last week. Wages reductions in each case were considerable; the Northumberland cut being especially heavy. In each case the men complain bitterly, and it is generally acknowledged that their wages will be at a very low level. On the other hand, the owners' contention that even now the costs will not be brought down to a profitable level is borne out by the last ascertainment figures. The actual results of the cuts are estimated at something like 6d. a ton in Durham and 8½d. in Northumberland.

The quietness in the market is probably partly due to a halt on the part of foreign buyers, who will no doubt want to see whether the wage reductions are to have any effect on quotations. On the facts mentioned above, collieries will obviously have to maintain prices if they possibly can. The awards are valid for three months.

Gas coals remain fairly steady, the home demand being quite satisfactory. Wear Specials are nominally 16s. f.o.b., and best qualities 15s. 6d. Good seconds are 13s. 6d. to 14s.; other qualities being obtainable down to 13s. The demand for coking has fallen off; good qualities being obtainable at 13s. 9d., and others down to 13s. 3d. The inquiry for Durham unscreened steams is quieter. Best qualities quote 14s. 9d., and others 13s. 3d. to 14s. Northumberland steams are offered at 13s. to 13s. 3d. for best screened sorts, and are generally short of trade. Inquiry for gas coke is not quite so brisk; but it is well sold to the end of the month, and the quotation is maintained at about 22s. 6d. f.o.b. for shipment.

YORKSHIRE AND LANCASHIRE.

Gas undertakings are beginning to make inquiries in regard to coal supplies—in some instances for deliveries to commence as far ahead as July 1. There appears to be a feeling of indecision among colliery companies who produce gas coals on the question of any stabilized figure. Efforts have been made to improve on last year's prices, and the position may be affected by the results of the working of the Five Counties scheme.

The general industrial market is fairly steady, with slacks declining in value. Coking smalls are easy, and advances made during December are not being maintained. Furnace coke is not moving too freely, and values are slightly discounted.

Small business is being done for export, and foreign buyers are holding off their purchases until the end of the month.

The domestic trade remains quiet for the time of the year. Other forms of heating introduced as a result of the last stoppage are no doubt making themselves felt. Prices generally have a slight declining tendency, especially for spot sales. Collieries are able to execute all orders promptly.

The following are the Humber bunker and export prices, f.o.b. usual shipping ports: South Yorkshire—Hards, Association, 15s. to 15s. 3d.; screened gas coal, 15s. 9d. to 16s. 3d.; washed trebles, 16s. to 16s. 3d.; washed doubles, 15s. to 15s. 3d.; washed singles, 15s. to 15s. 3d.; washed smalls, 10s. 9d. to 11s.; smithy peas, 17s. to 18s. 3d. per ton. West Yorkshire—Hartley's (f.o.b. Goole), 14s. to 15s.; screened gas coal, 14s. 6d. to 15s. 6d.; washed trebles, 15s. 9d. to 16s.; washed doubles, 15s. to 15s. 3d.; washed singles, 14s. 6d. to 15s.; washed smalls, 10s. 6d. to 11s.; unwashed trebles, 14s. 9d. to 15s. 3d.; unwashed doubles, 11s. to 11s. 6d.; rough slack, 9s. to 10s.; coking smalls, 9s. to 9s. 6d. per ton.

Derbyshire and Nottinghamshire—Top hards, 15s. 6d. to 16s. 6d.; washed trebles, 15s. 3d. to 15s. 9d.; washed doubles, 15s. to 15s. 3d.; washed singles, 15s. to 15s. 3d.; washed smalls, 10s. 9d. to 11s.; rough slack, 9s. 6d. to 10s. per ton.

Yorkshire, Derbyshire, and Nottinghamshire—Screened steam coal, 14s. to 14s. 6d.; gas coke, 22s. 3d. to 25s.; furnace coke, 17s. to 17s. 6d. per ton.

In Lancashire, trade is slow, with stocks of house coal accumulating. Spot lots are offered at low prices; but industrial descriptions have a better tone. Quotations: Lancashire best house, 31s. to 32s.; seconds, 27s. to 28s.; common, 19s. to 21s.; kitchen, 22s. to 24s.; Yorkshire selected house, 32s. to 34s.; best house, 26s. to 28s.; cobbles, 18s. to 20s.; nuts, 15s. to 17s.; washed doubles, 13s. to 14s.; washed singles, 12s. 6d. to 13s. per ton in wagons at pit.

MIDLANDS.

There is no increase of industrial activity to stimulate the demand for fuel, and the market is about as lifeless as it can be. By taking stringent precautions against exceeding consumptive requirements collieries are preventing irregularities in supplies. The market initiative has passed so completely out of their hands that they are no nearer to getting remunerative prices. With the limitation of output in other directions, slacks are no more than sufficient for current needs. Most of the business is done at 6s. 6d. to 7s. 6d. at the pits.

Continued mild weather has accentuated the flatness of the house coal trade. There is no improvement in the turnover, apart from local shifting of the incidence. Warwickshire collieries are doing rather better in the southern market, where a proportion of their trade had been diverted to the North-East Coast by reason of the lower cost of water transport. The new railway rates do something to redress the balance in certain parts of the south. Probably the effect is not very considerable, but with competition keen a slight turn of fortune is acceptable.

Blast furnace cokes in the Midlands show no movement corresponding to the stiffening of Durham prices. Business is done at 12s. 6d. or less on rail.

Representation is to be made to the Bishop Auckland Gas Company by the Urban District Council for a revision of charges.

TRADE NOTES.

Pyrometers, &c.

Messrs. Lewenz & Wilkinson, Ltd., of 25, Victoria Street, S.W. 1, have been appointed sole agents for Great Britain and Northern Ireland for Messrs. Keiser & Schmidt, Charlottenburg, for the sale of pyrometers and resistance thermometers of all descriptions manufactured by that firm.

Removal.

Owing to larger premises being required, George Wilson Gas Meters, Ltd., have removed their London Works from 46 and 47, Auckland Street, Lambeth, to Certus Works, 579, Kingston Road, Raynes Park, London, S.W. 20. The telephone number is: "Wimbledon 0720;" Telegrams: "Gaseous Cotton."

"Pyruma" Plastic Fire Cement.

Messrs. J. H. Sankey & Son, Ltd., of Canning Town, E. 16, firebrick and fire cement manufacturers, have published an illustrated leaflet describing their "Pyruma" plastic fire cement. This is made in two grades—a coarse grade for setting and repairing large firebrick work, and capable of withstanding temperatures up to 3200° Fahr.; and a fine grade for small firebrick work, and capable of withstanding temperatures up to 2500° Fahr. The coarse grade can be applied to a red-hot surface.

Becker Self-Sealing Coke Oven Door.

The Transporting Machinery and Engineering Company, Ltd., Contracting Engineers, 76, Victoria Street, Westminster, S.W. 1, inform us that they have recently obtained the sole licence for "an invention which is of the greatest interest to gas engineers and coke oven managers." This is the Becker self-sealing coke oven door, which has been installed in Germany and other European countries in more than 2600 coke ovens, with the best results. A number of the big manufacturers and users in this country have already taken a keen interest in this invention. Some orders have recently been placed in this country, and other important ones are pending.

Becker Coke Ovens for Sheffield.

The Woodall-Duckham Vertical Retort and Oven Construction Company (1920), Ltd., have received an order from the Thorncliffe Coal Distillation, Ltd., Sheffield, to build an entirely new central coke oven works at Smithywood, near Sheffield. The installation will comprise a battery of 59 Becker ovens 40 ft. 8 in. long by 12 ft. 6 in. high by 16 in. wide. The plant will be capable of coking approximately 1500 tons of coal slack per day. It will be complete with a semi-direct recovery plant for the production of neutral sulphate of ammonia, tar plant, benzole plant, coal handling equipment, coke handling and screening plant, steam raising plant, and all railway sidings and roadways.

New Gasholder at Oswaldtwistle.—The Ministry of Health have sanctioned a loan of £10,000 proposed by the Oswaldtwistle District Council for the construction of a new gasholder, which formed the subject of an inquiry three weeks ago. The Council will put the work in hand in the course of a month, and it is intended to proceed with the dismantling of the old holder early in March.

Trades Exhibition at Leamington.—A ten-day Trades Exhibition was opened yesterday at the Winter Halls, Leamington. The object of the exhibition is to make everyone acquainted with modern methods of cooking, and to demonstrate the latest domestic appliances. The exhibit of the Leamington Priors Gas Company takes the form of a modern house fitted with the latest labour-saving appliances.

Successful Gas Exhibition in Bradford.—Mr. E. J. Sutcliffe, the Bradford City Gas Engineer and General Manager, reported to his Committee, on Feb. 10, that the week's exhibition of gas appliances at the Mechanics' Institute in January had resulted in orders during the week for 51 cookers, 31 fires, and 2 wash-boilers, and since the show seventy further cookers, the orders for which were traceable directly to the exhibition, had been booked.

Chesterfield Gas Undertaking.—The Chesterfield Gas Committee state that £2250 will be required for street lighting by gas during the year ending March, 1929, and this amount will cover the proposed additional street lighting between Brampton and Whittington. The Committee suggest that the Gas Engineer should confer with the Borough Treasurer and report on the desirability of an alteration in the present basis of calculation of prices charged for gas for all purposes.

Bradford Ideal Homes Exhibition.—The Bradford Corporation Gas Department are organizing a bread-baking and cake-making competition for users of gas cookers, at an Ideal Homes Exhibition to be held in Bradford from Feb. 28 to March 10. For the baking of a 2-lb. white loaf, the three prizes will be a "Eureka New World" gas cooker, a Main high-grade cooker, and a "Hygienic" cooker. For the lunch cake competition, the prizes will be three guineas, two guineas, and a "Kepston" ironing board. Cookery books will be given as consolation awards.

Gas and Electricity at Leeds.—The opposing interests of the Gas and Electricity Departments of the Leeds Corporation were mentioned at a recent meeting of the City Council, when it was agreed that the question of applying to the Electricity Commissioners for authority to borrow £20,000 for assisted wiring be referred to the Finance Committee. Mr. E. J. Clarke, Chairman of the Gas Committee, pointed out that, though the Electricity Department might gain a new customer by every case of assisted wiring, it was at the expense of the Gas Department, at any rate as far as lighting was concerned. Alderman D. B. Foster, Chairman of the Electricity Committee, said that a conference between the two Departments was the best way to approach the matter, and make the loss of the Gas Department as little as they could in the change-over.

Corwell, Ltd., is the title of a Company registered, with a capital of £2000, to carry on business as specialists in gas and electric radiators.

Combined Gas and Electricity Supply.—The Salcombe Gas and Electricity Company, who as a gas-making undertaking date from 1865, have acquired the Salcombe and Kingsbridge Electricity Order, and are putting it into operation in conjunction with the gas business for the supply of electricity in the urban districts of Salcombe and Kingsbridge and the parishes of Malborough and West Alvington. It is proposed to erect a generating station at the gas-works, utilizing the town gas for operating the dynamos by means of gas engines. The cables generally are to be run overhead; but there will be a certain proportion underground in both Salcombe and Kingsbridge.

Dangers of Water-Slide Chandeliers.—The dangers of water-slide gas chandeliers were emphasized at an inquest on Feb. 7 on Richard Thomas Stevens, a builder, of Camberwell, who died following a gas explosion due to a defective chandelier at his home. An official of the South Metropolitan Gas Company said these chandeliers were the property of the users. Notices had been sent to all users warning them of the danger attending them, and informing them that these chandeliers would be converted at the Company's expense. "I think it is important that the public's attention should be drawn to the dangers of these old-fashioned chandeliers," he said. A verdict of "Accidental death" was recorded.

Holders as Guides for Airmen.—One of the latest holders in the United States to be utilized for guiding airmen is at East St. Louis, where Mr. M. R. Noack, the Manager of the Illinois Power and Light Corporation, has had painted on the crown of a 1½ million c.ft. holder a white arrow 18 ft. by 142 ft., together with the words "Scott Field" in letters 19 ft. long. The arrow points the direction to Scott Field, which is fourteen miles away. In order to learn just how effective this marker was, Mr. Noack went on an inspection trip in a dirigible, when it was ascertained that the marker was visible at an altitude of 1000 ft. Four electric lamps attached to the standards illuminate the top of the holder by night.

Poisoned by Small Gas Escape.—An inquest was held at the Manchester City Coroner's Court recently on John Patria Mooney, of Higher Ardwick. Mooney was found dead in bed on Wednesday morning with the gas jet alight. William E. Saunders, chief installation inspector for the Corporation Gas Department, said he examined all the fittings and gas arrangements in the room, but could not find a leakage of gas. Later he applied the Burnsen tester and discovered a crack in the bracket arm. Not until the gas was lighted, therefore, was there an escape; and even then it was so small that it failed to ignite by the application of a light. Dr. Bucks, who stated that death was due to gas poisoning, said he did not think it possible for anyone to inhale sufficient poison with the gas burning, provided there was no escape, but a person might be asphyxiated. The Coroner returned a verdict of "Accidental death," saying it was a clear case of misadventure.

Theft of Gas.—At the Birmingham Police Court on Friday, William Bayliss, coffee house proprietor, of Spring Hill, Birmingham, pleaded guilty to stealing 2800 c.ft. of gas belonging to the Birmingham Corporation, and was fined £10, or 51 days' imprisonment. Mr. Rigby Seymour prosecuted on behalf of the Corporation. The offence was grave, he said, because of the ingenious method employed. The inlet and outlet pipes were disconnected from the meter, and a rubber tube with a metal nozzle at each end was inserted to connect the two pipes. It was most difficult for the inspectors to detect the trick, for when they called the pipes had been reconnected with the meter. Defendant told the Court that the meter was too small, and he had not been able to get a sufficient force of gas. The Chairman (Mr. Adkins) pointed out that Bayliss had rendered himself liable to imprisonment and a fine of £50. As that was his first offence, they would only impose a fine.

Reading Gas Company Workmen's Dinner.—The workmen of the Reading Gas Company held their annual dinner at Palm Lodge on Feb. 4. After the Loyal Toast had been honoured, Mr. L. A. Rumble (Chief Assistant) proposed the toast of "The Chairman and Directors of the Reading Gas Company." Mr. D. H. Helps (Engineer and Manager), who presided, said that since he entered the gas industry he had had experience of five Boards of Directors, and he could assure them that none had been more sympathetic than the Directors of the Reading Gas Company. In March, he said, he would have completed 25 years' service with the Company. In 1903 the sales of gas amounted to 445 million c.ft. The corresponding figure for 1927 was 1197 millions. Mr. C. H. Eves proposed the toast of "The Chairman;" and in reply Mr. Helps said he welcomed the opportunity of expressing his great appreciation of the assistance rendered to him by all departments.

Albert Forgan (aged 64), stoker at Bridgwater Gas-Works, was killed through falling down a lift, a distance of 20 ft. He was leading stoker of the night shift; and shortly before the time to leave work, he had to take a drum of coke from the ground floor to the first floor. He was found dead at the bottom of the lift, with the drum, then empty, on top of him. Forgan had been in the Company's employ 39 years.

As the town of Bangor, the third largest in Ulster, and a popular watering place, has lately been created a borough, the newly-elected Aldermen and Councillors, together with the Town Clerk (Mr. James Milliken) and the Town Surveyor (Mr. George Fleming) took the opportunity of paying a visit of inspection to the town's up-to-date gas-works, where they were received by the Manager, Mr. Baker Mitchell, who conducted them on an interesting round, explaining the various processes. The members, who were impressed with the extent and efficiency of the undertaking, thanked Mr. Mitchell and complimented him on the state of the plant and premises.

STOCK MARKET REPORT.

THE unfavourable monetary position continued to depress investment stocks last week, and the position was accentuated by forced sales to meet income-tax demands. Most of the Home Government stocks cheapened; but as is usually the case on sudden variations in values, the 5 p.ct. War Loan suffered least of all.

With Industrials dominating the markets for so long a period, it was gratifying to see the revival of interest in Home Rails, in which there is plenty of room for improvement. The satisfactory Southern announcement encourages the hope of an improved Great Western dividend.

Business in the Gas Market was up to expectation. With the publication of each company's accounts, the previous anticipation of a successful year's trading is confirmed. Among the most recent announcements, the Bristol, Portsmouth, South Suburban, and Uxbridge Companies all show increased outputs and substantial increases in profits. The Portsmouth and Uxbridge Companies are also recommending slightly higher dividends. The interest in the Oriental stock continued, and there was a further rise of 4 points to 116-121. Imperial Continental capital advanced 3 points, and the Barnet 7 p.ct. and the Uxbridge 5 p.ct. 2 points. There were no declines in values excepting *ex* div. reductions. The first dealings in the Gas Light ordinary £1 quotation are of interest. Assuming a fall equivalent to the half-year's dividend, less one-fifth for tax, the last quotation per £100 would have been 93½ *ex* div. The stock per £1 is now quoted *ex* div at 19s. 3d., which is equivalent to £96 5s. per £100. The change, from the present investors' point of view, therefore appears to be justified; but it remains to be seen whether the higher prices will be maintained.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Feb. 10.	Rise or Fall on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 9	5	5	Aldershot 5 p.c. max. C.	67—72*	−1	..
412,992	,,	,,	4	4	Do. 4 p.c. Pref.	69—72*	..	₹71—71½
1,561,868	,,	Sept. 29	7	7	Alliance & Dublin Ord.	95—99	..	..
374,000	,,	Jan. 12	4	4	Do. 4 p.c. Deb.	64—67*	..	..
532,554	,,	Aug. 25	—	7	Barnet Ord. 7 p.c.	107—110	..	..
800,000	1	Oct. 13	1/7½	1/7½	Bombay, Ltd.	21/6—23/6	+2	107—109½
170,000	10	Aug. 25	8½	8½	Bournemouth 5 p.c.	12½—13½	..	22/1½
600,050	10	,,	7	7	Do. B 7 p.c.	12—12½	..	..
375,000	10	,,	6	6	Do. Pref. 6 p.c.	10½—11½	..	..
50,000	Stk.	Jan. 12	3	3	Do. 8 p.c. Deb.	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb.	75—78	..	..
357,900	,,	Aug. 25	—	7½	Brighton & Hove 6 p.c. Con.	112—115	..	..
341,800	,,	,,	—	6/8/6½	Do. 5 p.c. Con.	100—103	..	113½—114½
1,387,500	,,	July 28	5	5	Bristol 5 p.c. max.	89—90a	+1	103
855,000	,,	Sept 29	7	8	British Ord.	111—114	..	..
100,000	,,	Dec. 22	7	7	Do. 7 p.c. Pref.	114—117	..	112½
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	72—75	..	..
200,000	,,	,,	—	33/2	Do. 5 p.c. Red. Deb.	93—96	..	..
100,000	10	Nov. 24	8	6	Cape Town, Ltd.	8—9	..	..
100,000	10	Oct. 27	4½	4½	Do. 4½ p.c. Pref.	6—7	+½	8½—8⅝
150,000	Stk.	Dec. 22	4½	4½	Do. 4½ p.c. Deb.	72—77	..	..
936,860	,,	July 28	6	6	Cardiff Con. Ord.	100—103	..	..
257,860	,,	Jan. 12	7½	7½	Do. 7½ p.c. Red. Deb.	101—104*	..	..
157,150	,,	Aug. 11	6½	6	Chester 5 p.c. Ord.	87—92b	..	..
79,185	1	Oct. 13	½/-	½/-	Colombo Ltd. Ord.	31/—33/-	..	..
34,495	1	,,	1/4½	1/4½	Do. 7 p.c. Pref.	20/—22/-	..	..
891,490	1	Oct. 13	1/9½	1/9½	Colonial Gas Assn. Ld. Ord.	24/—26/-	..	..
178,900	1	,,	1/7½	1/7½	Do. 8 p.c. Pref.	20/—22/-	..	..
2,073,280	Stk.	July 14	—	5	Commercial Ord.	97—100	+1	..
475,000	,,	Dec. 22	8	8	Do 8 p.c. Deb.	57—60	..	95—99½
800,000	,,	Sept. 29	‡1	‡1	Continental Union, Ltd.	28—33	..	..
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	90—95	..	28—28½
787,560	,,	Aug. 11	6½	6½	Croydon sliding scale	100—103	..	..
408,100	,,	,,	5	5	Do. max. div.	82—85	..	..
492,370	,,	Aug. 25	9	8	Derby Con.	103—105e	..	..
55,000	,,	Dec. 22	4	6	Do. Deb.	71—78c	..	..
209,000	,,	Aug. 25	5	4	East Hull Ord. 5 p.c.	78—81	..	..
50,000	,,	Dec. 22	5	5	Eastbourne 5 p.c. Deb.	90—95	..	..
1,902,180	10	Sept. 29	‡3	5	European, Ltd.	7⅞—8⅞	..	..
15,703,480	Stk.	Feb. 9	5	5/1/4	Gas Light & Coke 4 p.c. Ord.	19/0½—19/4½*	+½	8—8½
2,600,000	,,	,,	8½	8½	Do. 5½ p.c. max.	61—63*	..	19/0½—19/7½
4,187,020	,,	,,	4	4	Do. 4 p.c. Con. Pref.	76—79*	−1½	62—64½
5,602,630	,,	Dec. 22	8	8	Do. 3 p.c. Con. Deb.	60—62	−1	77½—80
181,815	,,	,,	6	6	Do. 6 p.c. Br'd'f'd Rd. Db.	101—104	..	60½—61½
1,642,770	,,	,,	5	6	Do. 5 p.c. Red. Deb.	98¼—100½	..	103½—103½
48,000	,,	—	7½	5	Do. 7½ p.c. Ilford Deb.	..	..	100—100¾
92,500	,,	Aug. 25	6½	7½	Hastings & St L. 5 p.c. Conv	89—92	..	..
268,740	,,	,,	6½	6½	Do. 3½ p.c. Conv.	70—78	..	..
70,000	10	Oct. 13	†10	†10	Hongkong & China, Ltd.	12¾—13½	..	..
173,200	Stk.	Aug. 25	5	5	Hornsey Con. 3½ p.c.	76—79	..	..
1,976,000	,,	Nov. 10	10	10	Imperial Continental Cap.	148—151	+1	77½—78
225,180	,,	Feb. 9	3½	3½	Do. 3½ p.c. Red. Deb.	67—69*	+5	147½—151
226,242	,,	Aug. 11	6½	7	Lea Bridge 5 p.c. Ord.	96—99	−1	67½—67⅞
2,146,907	,,	Aug. 11	5½	5½	Liverpool 5 p.c. Ord.	89—91b	..	..
600,000	,,	Sept. 29	7	7	Do. 7 p.c. Red. Pref.	103—105b	+1½	..
165,786	,,	Aug. 25	8	9	Maidstone 5 p.c. Cap.	107—112	..	..
75,000	5	Dec. 22	†7	†8	Malta & Mediterranean	5½—5⅝	..	110
541,920	Stk.	Nov. 24	†5	†5	Montevideo, Ltd.	92—94	..	..
2,061,315	,,	July 28	5	5	Newcastle & Gateshead Con.	79⅜—80½d	..	..
860,929	,,	,,	4	4	Do. 4 p.c. Pref.	67½—68½d	..	..
691,705	,,	June 29	3½	4	Do. 3½ p.c. Deb.	66½—67½d	..	..
191,785	,,	Aug. 25	—	6/18/0	North Middlesex 5 p.c. Con.	93—96	..	..
800,000	,,	Nov. 24	7	9	Oriental, Ltd.	116—121	+4	117—120
188,120	,,	Dec. 22	7½	7½	Plym'th & Ston'house 5 p.c.	102—107	..	..
414,500	,,	Aug. 25	7½	7½	Portsm'th Con. Stk. 4p.c. Std.	102—105	..	..
236,782	,,	,,	5	5	Do. 5 p.c. max.	76—79	..	..
2,334,464	1	—	—	—	Primitiva Ord.	20/6—21/6	..	..
247,500	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb.	90—93	..	..
685,000	Stk.	Jan. 26	4	4	Do. 4 p.c. Red. Deb. 1911	74—76*	..	20/9—21/1½
423,183	,,	Dec. 22	4	4	Do. 4 p.c. Cons. Deb.	74—76	..	..
150,000	10	Sept. 29	6	6	San Paulo 5 p.c. Pref.	83—85	..	..
125,000	50	Jan. 8	5	5	Do. 5 p.c. Red. Deb.	46—48	..	..
370,000	Stk.	Sept. 8	5½	5	Sheffield A	102—104c	..	..
419,968	,,	,,	5½	5½	Do. B	102—104c	..	..
1,047,000	,,	,,	5½	5½	Do. C	102—104c	..	..
90,000	10	May 26	5½	5½	South African	4—6	..	..
6,869,895	Stk.	Aug. 11	4	6	South Met. Ord.	105—107	..	..
500,000	,,	—	—	5	Do. 6 p.c. Irred. Pf.	110—113	..	105½—106½
1,896,445	,,	Jan. 12	8	—	Do. 5 p.c. Deb.	59—62*	..	..
734,000	,,	Sept. 8	3	3	Do. 6½ p.c. Red. Db.	102—104	..	60½
91,500	,,	Aug. 11	6½	6½	South Shields Con.	111—113d	..	103
1,245,795	,,	July 28	6½	6½	South Suburban Ord. 5 p.c.	105—108	..	..
867,837	,,	Dec. 22	6½	6½	Do. 5 p.c. Deb.	93—96	..	108
647,740	,,	Sept. 8	5	5	South'mpton Ord. 5 p.c. max.	79—82	..	..
121,276	,,	Dec. 22	5	5	Do. 4 p.c. Deb.	72—75	+1	79½
250,000	,,	Aug. 25	4	4	Swansea 7 p.c. Red. Pref.	108—106	..	..
200,000	,,	Dec. 22	7	7	Do. 6½ p.c. Red. Deb.	99—102	..	104½—105
120,600	,,	July 28	6½	6½	Tottenham District A 5 p.c.	110—115	..	..
882,275	,,	,,	7½	7½	Do. B 3½ p.c.	92—95	..	..
180,000	,,	,,	6½	6½	Do. 6½ p.c. Pref.	97—100	..	92½
161,955	,,	,,	5½	5½	Do. 4 p.c. Deb.	74—77	..	..
250,921	,,	Dec. 8	4	4	Tynemouth Con. and New	81—83d	..	..
	,,	Sept. 29	5	5	Uxbridge, Maidenhead, & Wycombe 5 p.c.	90—93	+2	89½
239,094	,,	Aug. 25	6½	6½	Do. 5 p.c. pref.	85—90	..	..
88,230	,,	,,	5	5	Wandsworth, Wimbledon, and Epsom—			
30,600	,,	July 14	8½	8½	Wandsworth A 5 p.c.	127—132	..	..
256,938	,,	,,	7	7	Do. B 3½ p.c.	107—112	..	..
432,655	,,	,,	5/19/0	5/19/0	Do. C and New	94—99	..	..
369,000	,,	,,	6½	6½	Wimbledon 5 p.c.	102—107	..	..
88,900	,,	,,	7½	7½	Epsom 5 p.c.	110—115	..	..
200,000	,,	,,	5	5	Do. 5 p.c. Pref	88—93	..	112½—114
88,416	,,	,,	5	5	Do. 3 p.c. Deb.	56—59	..	..
234,752	,,	Dec. 22	3	3	Do. 4 p.c. Deb.	75—78	..	..
	,,	,,	4	4			..	..

Quotations at:—a.—Bristol. b.—Liverpool. c.—Nottingham. d.—Newcastle e.—Sheffield. * Ex. div.
† Paid free of income-tax. ‡ For year.

The following transactions were recorded during the week:

On Monday, Aldershot 4 p.ct. preference 71, Bombay 22s. 1½d., Brighton and Hove 6 p.ct. 113½ Bristol 87½, Commercial 95, 96, European 8½, 8⅝, Gas Light and Coke 19s. 2¼d., 19s. 3d., 4 p.ct. preference 78½, 80, 3 p.ct. debenture 60⅜, 6 p.ct. debenture 103¾, 103½, Imperial Continental 147½, 148½, 148⅜, Oriental 120, Primitiva 20s. 9d., 20s. 10½d., 21s., 21s. 1½d., South Metropolitan 106½, Southampton 5 p.ct. 79½, Tottenham "B" 92½, Uxbridge 5 p.ct. 89½. Supplementary prices, Derby 5 p.ct. 103.

On Tuesday, Barnet 7 p.ct. 107, Brighton and Hove 6 p.ct. 114½, British 112⅜, Cape Town 8½, 8⅝, Commercial 99½, Continental Union 28½, European 8, 8⅝, 8½, Gas Light and Coke 19s. 2¼d., 19s. 3d., 19s. 3⅜d., 19s. 4d., 19s. 4½d., 3½ p.ct. 63¼, 4 p.ct. preference 78⅝, 78¾, 79, 3 p.ct. debenture 60½, 61, Hornsey 3½ p.ct. 77½, 78½, Imperial Continental 149, Oriental 117, Primitiva 20s. 10½d., 21s., 21s. 1½d., South Metropolitan 105½, 106, 106¼, 106½, 106⅜, South Suburban 5 p.ct. 108, Swansea 7 p.ct. preference 104⅜, 105, Wandsworth, Wimbledon (Epsom) 5 p.ct. 112¾, 114. Supplementary prices, Malta and Mediterranean 7 p.ct. preference 5.

On Wednesday, Barnet 7 p.ct. maximum 109½, Gas Light and Coke 19s. 3d., 19s. 3⅜d., 19s. 4½d., 19s. 5d., 19s. 6d., 3½ p.ct. maximum 64½, 4 p.ct. preference 80, 3 p.ct. debenture 60¼, 5 p.ct. debenture 100, Imperial Continental 148½, 150, Primitiva 20s. 10½d., 21s., South Metropolitan 105⅜, 106½, 3 p.ct. debenture 60⅜, 6½ p.ct. debenture 103.

On Thursday, Brighton and Hove 5 p.ct. 103, Commercial 96½, Gas Light and Coke 19s. 3d., 19s. 3⅜d., 19s. 4½d., 19s. 6d., 19s. 6½d., 19s. 7½d. *ex* div., 3½ p.ct. maximum 62, 62½ *ex* div., 4 p.ct. preference 77½ *ex* div., 3 p.ct. debenture 60⅜, Imperial Continental 3½ p.ct. debenture 67⅝ *ex* div., Primitiva 20s. 10½d., 21s., 21s. 0⅞d., South Metropolitan 106⅜, Southampton 5 p.ct. maximum 79¼. Supplementary prices, Brighton and Hove 4 p.ct. debenture 75½, South Suburban 7 p.ct. debenture 100, 100¾.

On Friday, Aldershot 4 p.ct. preference 71½, Continental Union 28, Gas Light and Coke 19s. 1½d., 19s. 2¼d., 19s. 3d., 19s. 4½d. *ex* div., 3½ p.ct. maximum 62½, 63½, 4 p.ct. preference 77½, 3 p.ct. debenture 61½, 61⅝, 5 p.ct. debenture 100½, Imperial Continental 149, 149½, 151, 3½ p.ct. debenture 67½, Maidstone 5 p.ct. 110, Primitiva 20s. 9d., 20s. 10½d., 20s. 11¼d., 21s. 1½d., South Metropolitan 105½, 106½, 3 p.ct. debenture 60¾. Supplementary prices, Crowboro' 64.

Money was in plentiful supply at the week-end, and the rate for fresh accommodation quickly fell from 3¾ p.ct. down to 3 p.ct. Old day-to-day advances were renewed at 3½ p.ct. Discount quotations were maintained in spite of the lower rate at which Treasury Bills were allotted. Only £30,000,000 of these were offered, and the rate averaged £4 4s. 0·12d. p.ct., or 3·63d. p.ct. below the previous week's rate.

Foreign exchanges generally were inclined to move in favour of Sterling. The New York rate closed at $\frac{3}{16}$c. higher at 4.87$\frac{13}{32}$. Belgas rose to 35 for the first time since stabilization. Pesetas were higher at 28.69. Lire advanced to 92.05½, and German marks rose to 20.44. There was no change in French francs, the quotation being 124-124.03.

Silver on Chinese buying rose to 26⅝d per oz.; and Gold was quoted at 84s. 11½d. per oz.

The Bank rate is 4½ p.ct., to which it was reduced from 5 p.ct. on April 21. Bankers' deposit rates are 2½ p.ct. The deposit rates of the discount houses are 2⅜ p.ct. at call and 2⅝ p.ct. at notice.

For NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS
See "JOURNAL," February 1, p. 280.

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Clerk to the Council.

Town Hall,
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